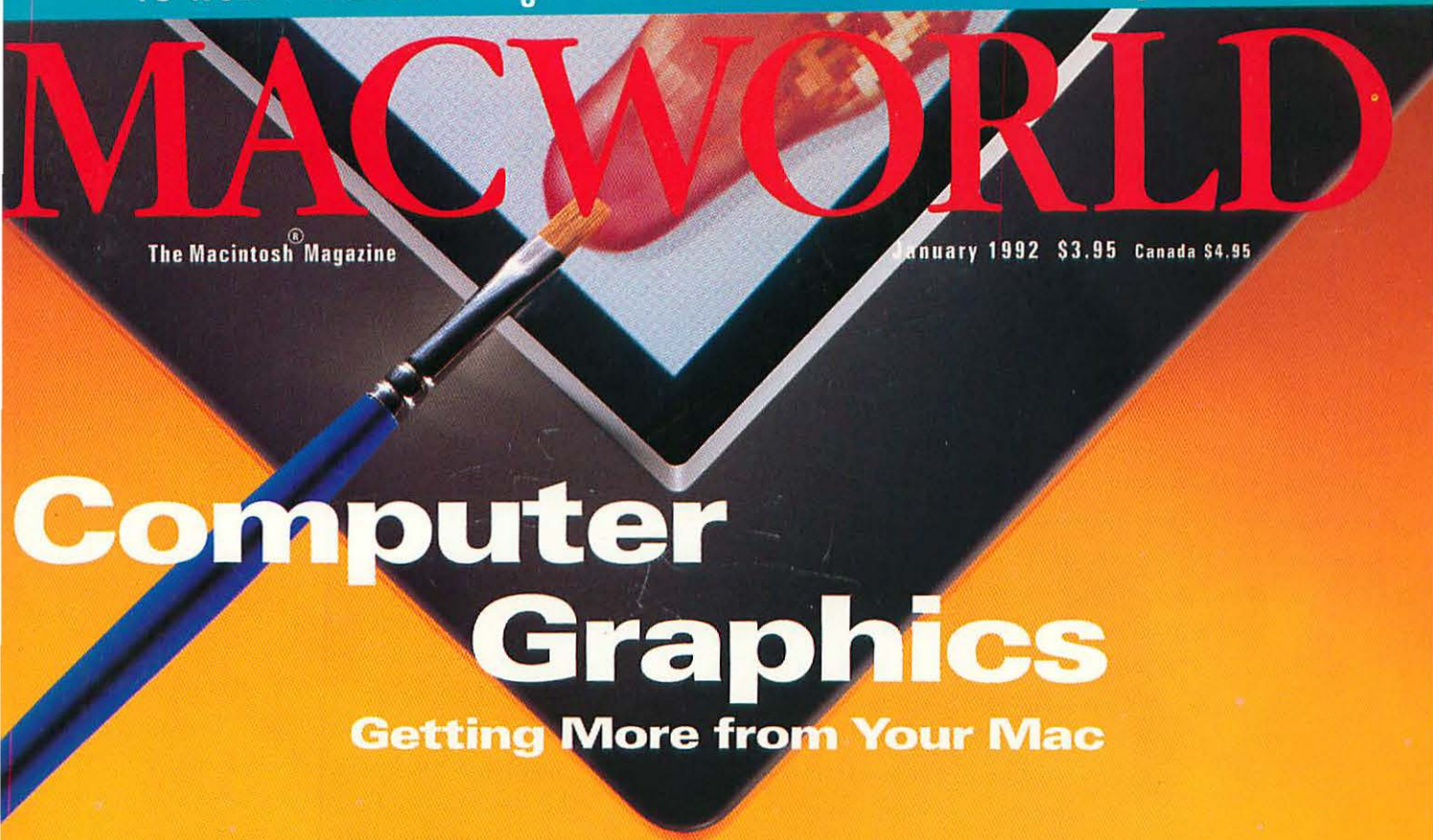
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MACWORLD

The Macintosh® Magazine

January 1992 $3.95 Canada $4.95



Computer Graphics

Getting More from Your Mac

24-BIT MONITORS

MW LAB 26 Products Tested

Picking the Best of

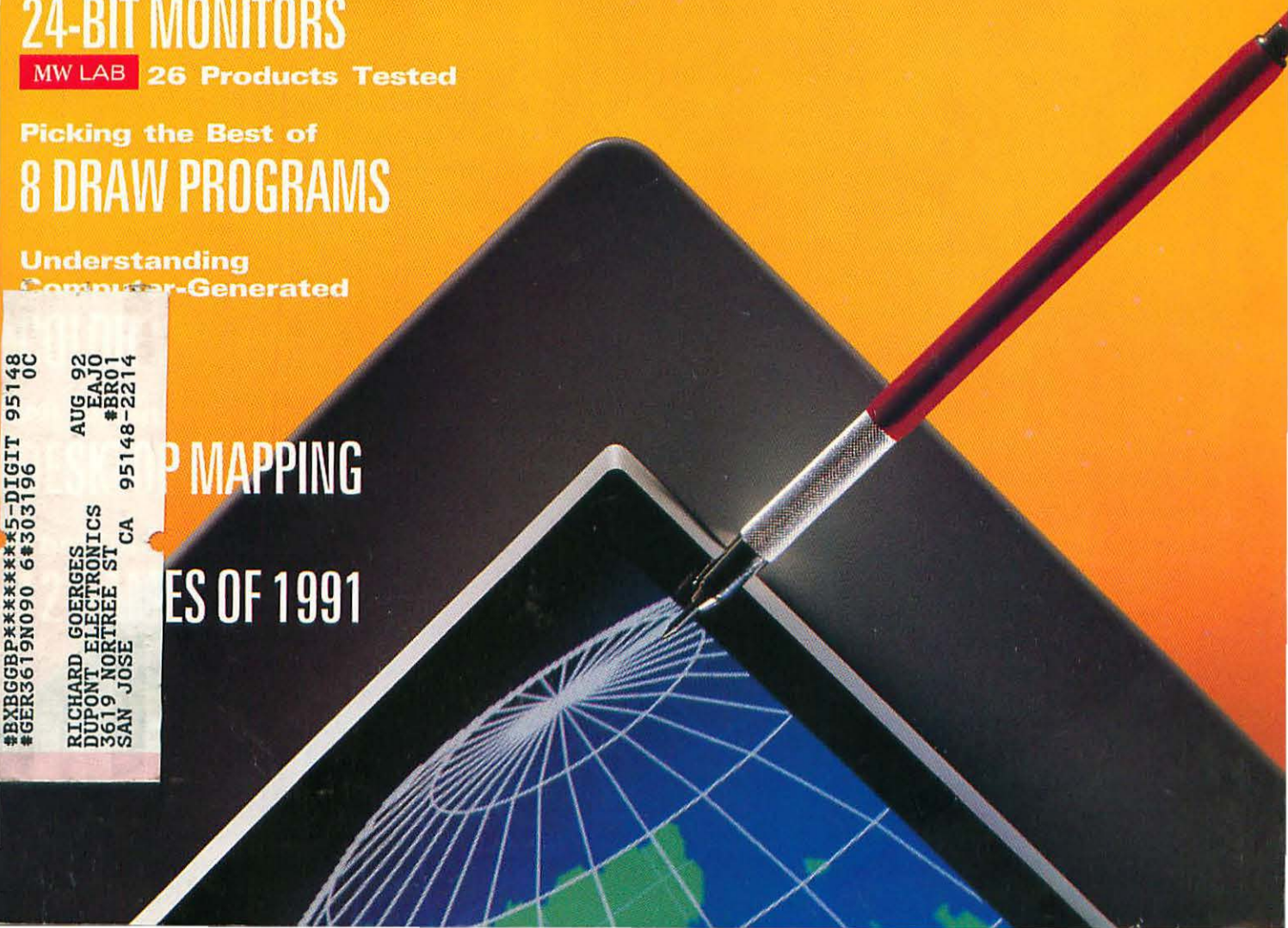
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Understanding

Computer-Generated

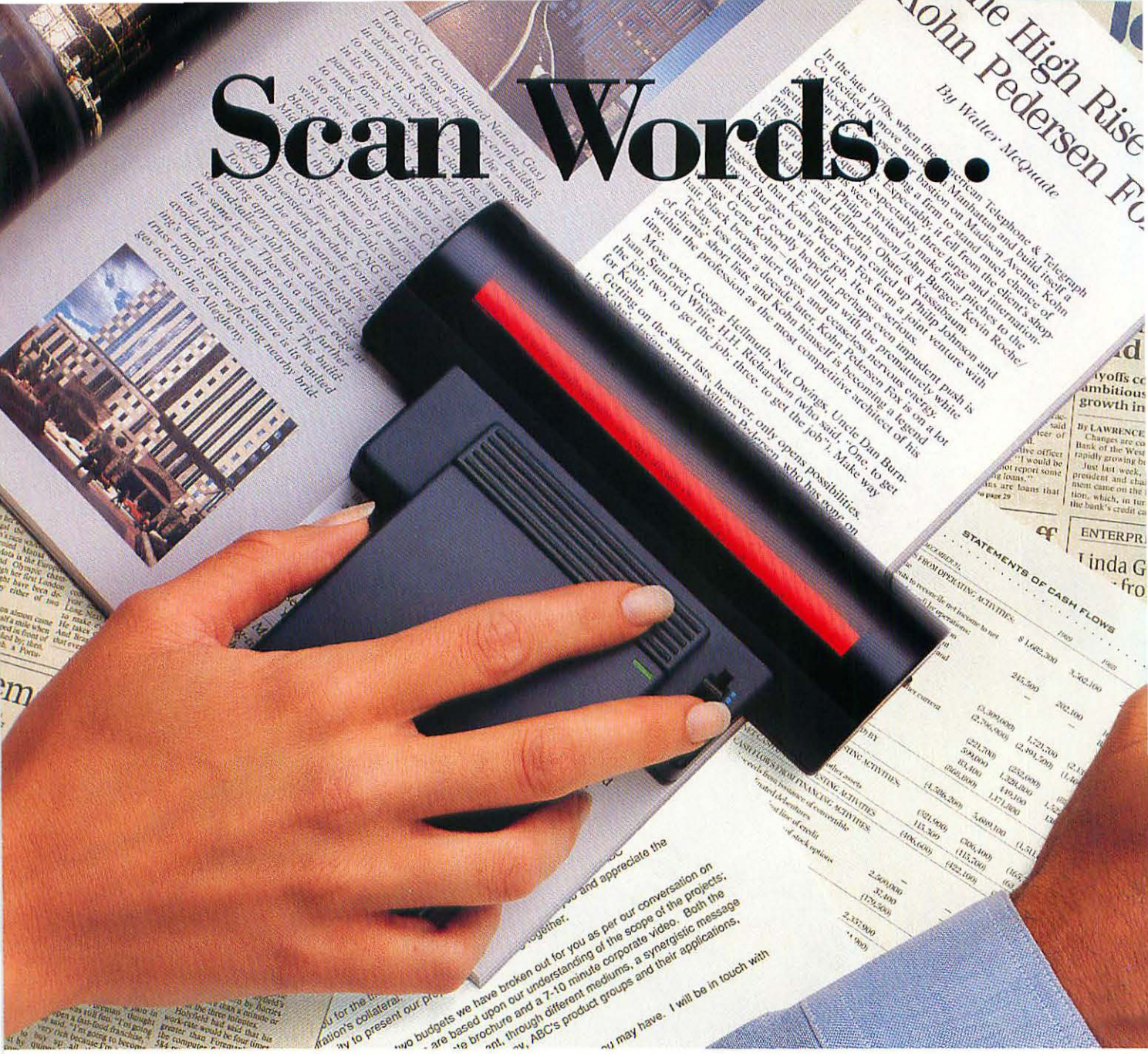
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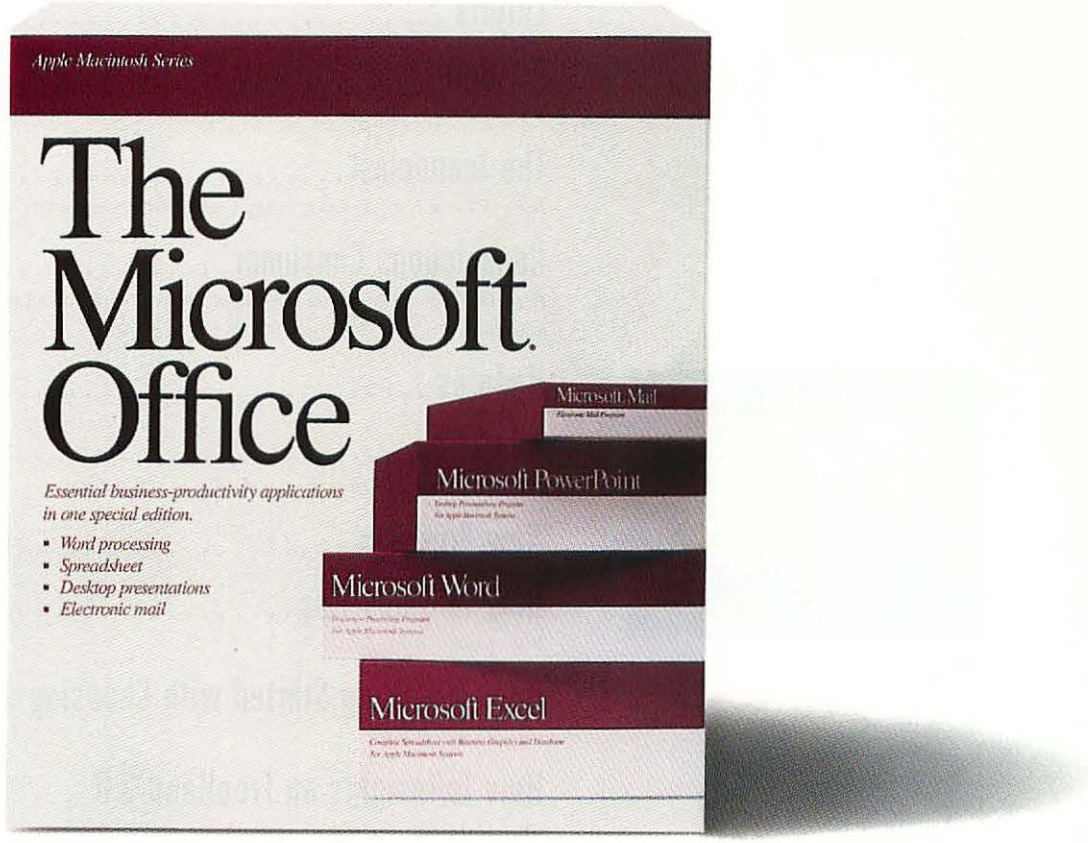
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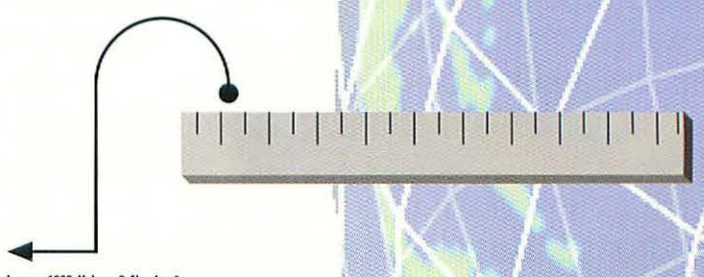
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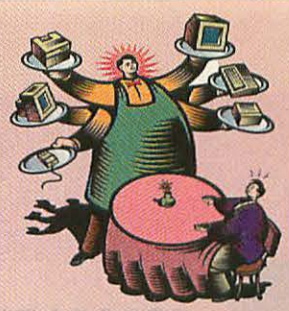
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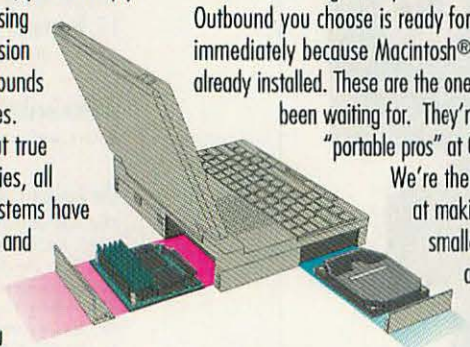
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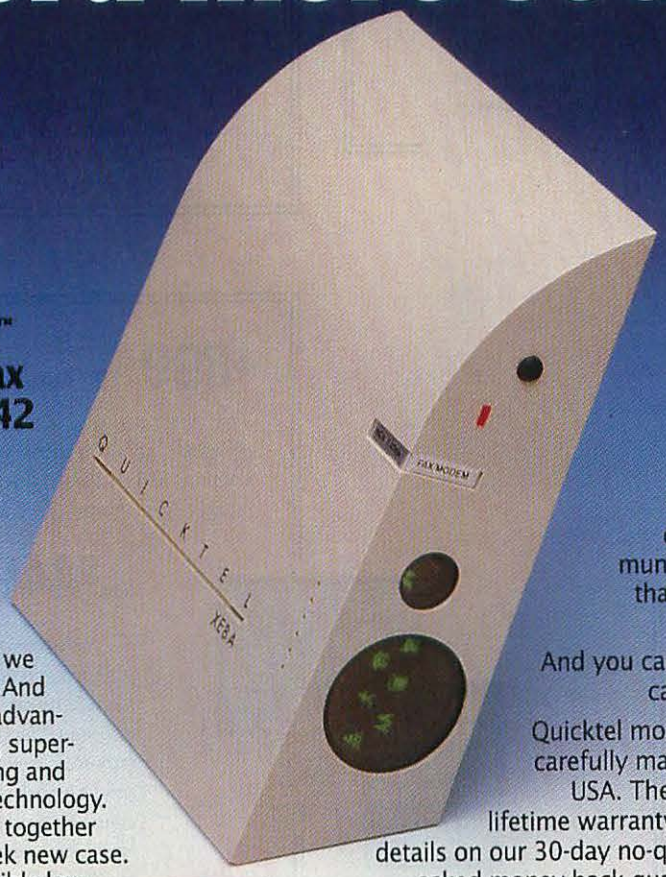
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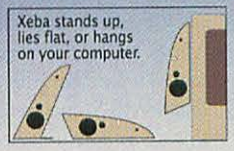
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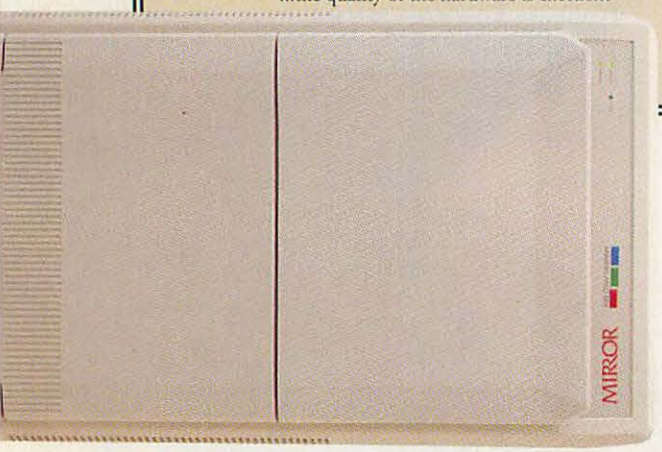
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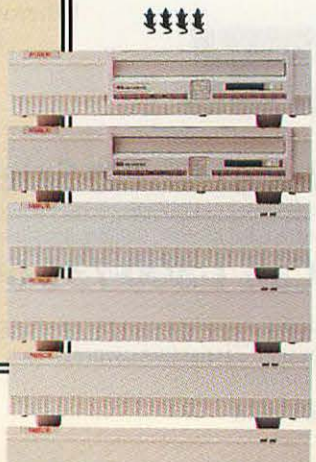
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* MacUser Magazine, December 1991

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*MacUser Magazine, May 1991



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Work Sets and System7

Find out about new system capabilities which will save you from the drudgery of repetitive work

What makes a computer environment efficient? Some will say it's being able to run a batch of commands by committing unnatural acts with your keyboard, such as typing something like: find .\(-name a.out -o -name '*.o'\) -atime +7 -exec rm {} \; Most Macintosh users would disagree.

Greater efficiency and increased convenience should not mean learning a different and unfriendly language. The System 7 team knew that, too, when they opened the door for a more efficient Macintosh environment.

An Alias By Any Other Name

If you have System 7, you've probably already discovered aliases. An alias looks like a copy of a document, but it's really just a tiny file (about 1 to 2K in size) that directs your Macintosh to the original document. Aliases come in handy when you want quick access to programs or documents located deep inside your hard disk. Make an alias and place it right on your desktop, or even in the Apple Menu folder (in which case the alias is listed in your Apple menu).

A Step Beyond

The release of System 7 has sparked the appearance of utilities designed specifically for its powerful capabilities. One of these is Kiwi™ POWER WINDOWS, the first comprehensive window and document management tool. It offers a sophisticated and flexible window placement system that helps you maximize your use of available screen space in all your applications.

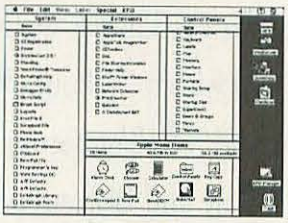
It also features a document management system that takes the alias concept into a new dimension.

Work Sets: The Next Frontier

The Kiwi POWER WINDOWS document management system is based on an idea called Work Sets. If you're a "power user" and use aliases, you'll *love* Work Sets.

Like an alias, Work Sets are tiny files which can reside anywhere on your hard disk. But instead of referring to a single file, Work Sets represent a group of files *and their associated windows*. When you open a Work Set, Kiwi POWER WINDOWS automatically launches applications, opens every document in the set, and restores all corresponding windows to the positions they occupied when you originally created that Work Set. They can also contain documents from several applications.

Work Sets can even include Finder windows (folders) that you use often, and like to see displayed in a certain way. Just imagine: one click and your System, Extension, Control Panel, and Apple Menu Items folders all pop open, ready and waiting for another round of System maintenance.



Work Sets make life easier by providing instant access to groups of windows, documents and files—with one click of the mouse.

Finder Work Sets are terrific for shared volumes and CD ROMs, providing a quick way to display contents of those disks in a personalized manner that suits *your* needs.

Work Sets will enpower you to mold your Macintosh into an efficient work environment that fits you like a glove.

Smart Stuff

You might ask what happens if you move or rename the documents which are part of a Work Set, or if you change screens, or if you want a document from one application to be opened by another? Kiwi POWER WINDOWS will handle that—and more. You can even send Work Sets to colleagues on the same network and it will retrieve documents on a shared disk, or ask for a particular floppy. This product is not a gimmicky, window dressing gadget. It's a real power user tool.

Get The Facts

Work Sets are only one of Kiwi POWER WINDOWS' advanced capabilities. With its Window Layouts, it manages windows as effortlessly as it manages documents and folders.

For more details, call the Kiwi Software information line at 1-800-321-5494. And if you mention that you saw this advertisement in Macworld, you just might get lucky: every 50th caller will win a free copy of the program. One call per person, valid while quantities last.

Kiwi POWER WINDOWS is available from your software supplier, or directly from Kiwi Software. Suggested retail price $79.95.

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Marketing Communications Assistant **Darien Werfhorst**
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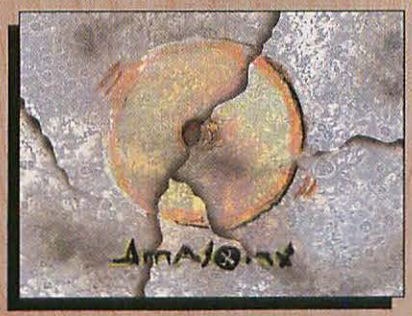
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Single-Copy Sales Director **George Clark**
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Single-Copy Sales Rep **Martin Garchar**
Subscription Analyst **Elizabeth Jensen**
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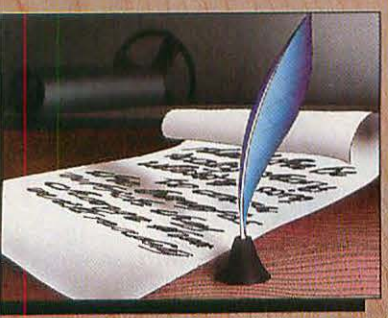
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The Evolution of CAD

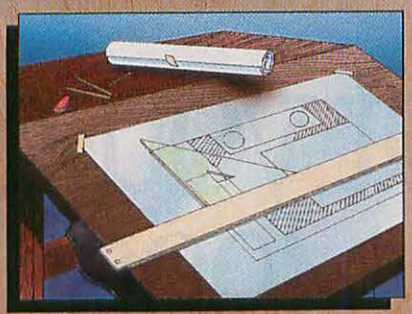
From the beginning of time, man has tried to express himself through graphics.



In the beginning man had to use primitive tools for creating graphic designs.



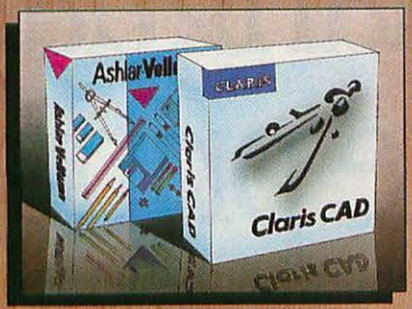
In the 15th Century design tools were quill ink pens and crude styles of paper.



By the 18th Century man had advanced to the drafting table with the T-squares, slide rules, precision ink pens and the dreaded eraser.



In the 20th Century the first CAD programs were very slow and extremely difficult to use, not to mention the expense of buying them.



As programs became easier to use, they thought they were radical and intelligent, but lacked real CAD power.

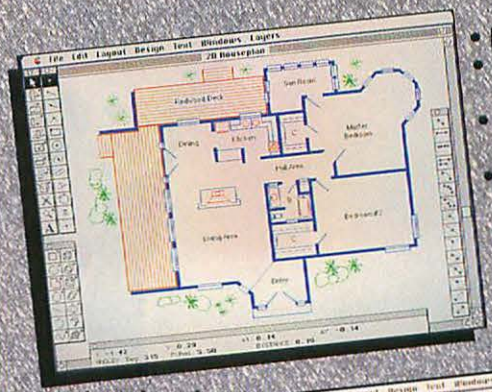
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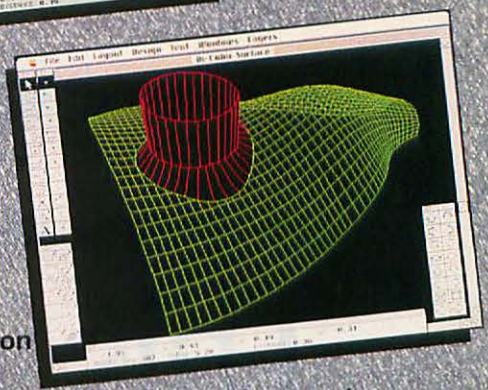
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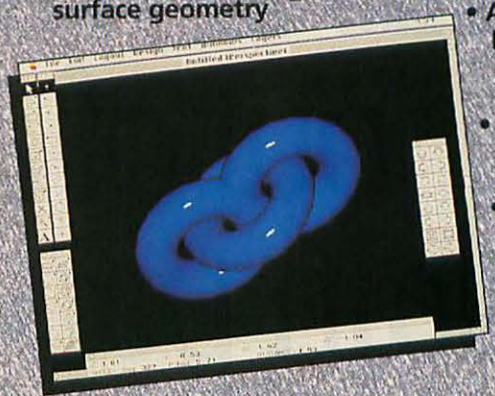
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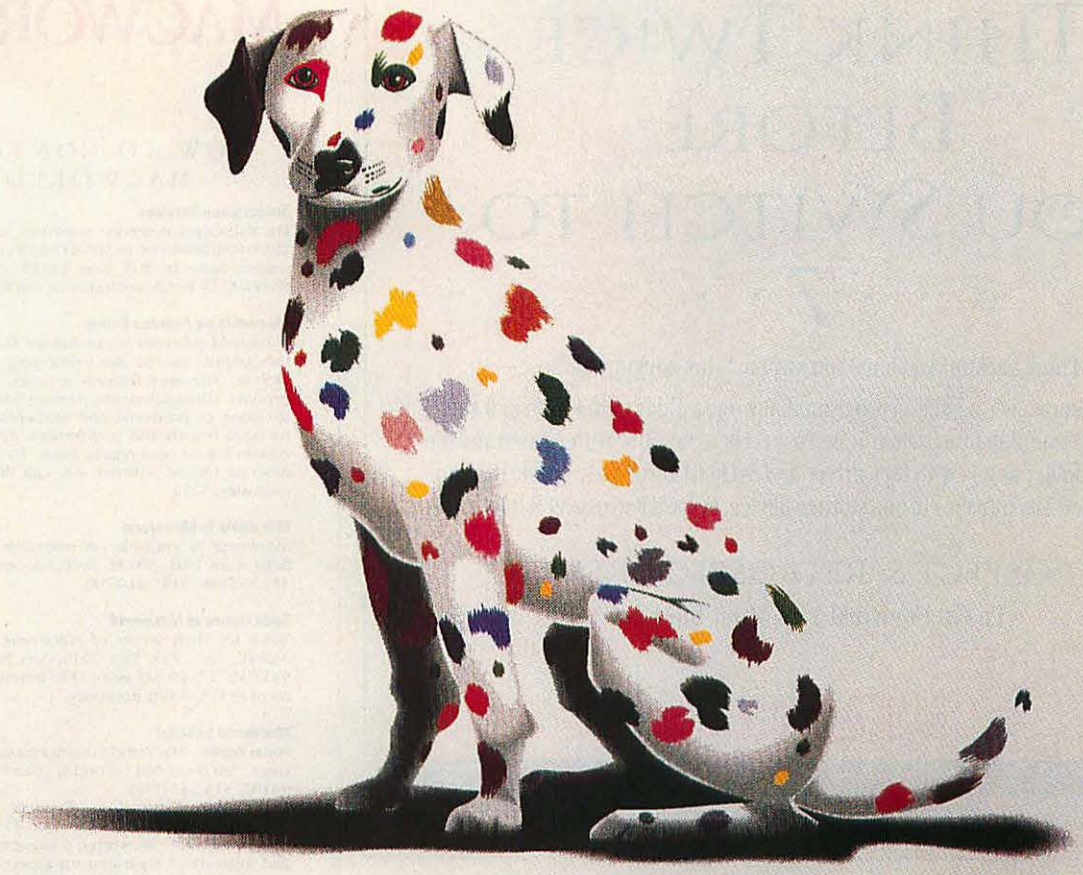
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RETROSPECT & RETROSPECT REMOTE

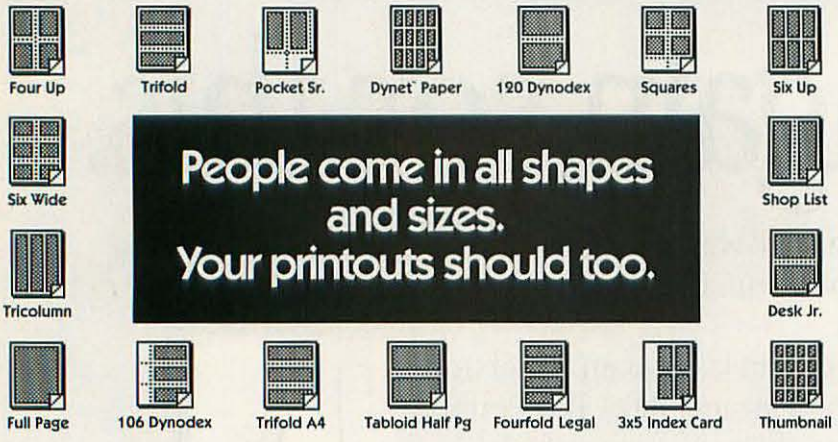
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New Products and Updates Direct press releases and product announcements (by mail or electronically), and shrink-wrapped software upgrades (by mail or courier) to: New Products Editor.

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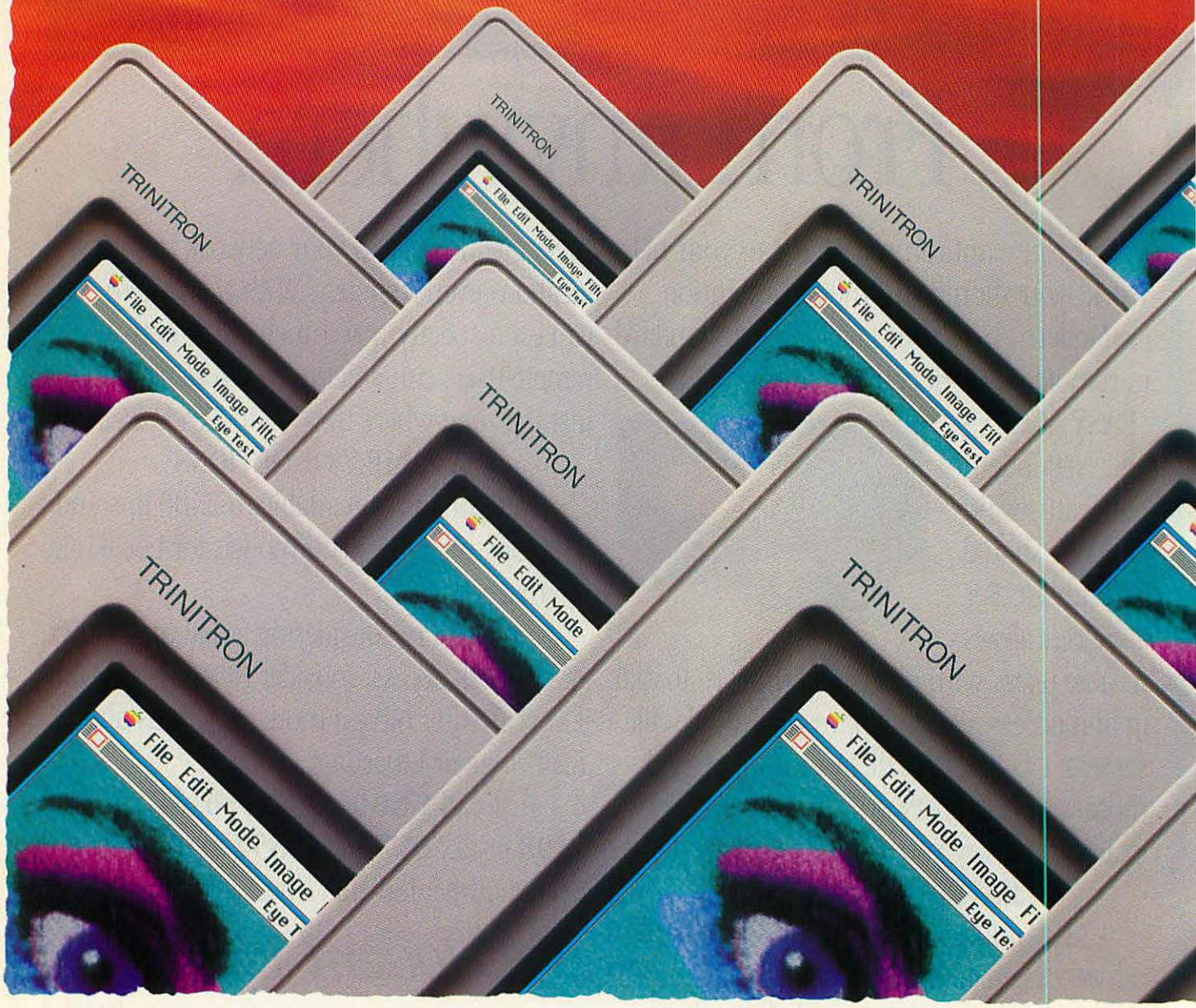
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MacBulletin

The Future of Groupware

The use of electronic mail as the transportation backbone for multiuser software is increasing. To make life easier for developers, Lotus Development, Apple, and IBM are working on a programming standard called Open Mail Interface. Any OMI-compliant E-mail will provide the hooks programmers need to use E-mail for such applications as office calendars, even across multiple E-mail systems and operating systems. Developers can contact Ted Reall at Lotus, 617/693-4610.

Apple Announces Groupware Platform

Apple's recently announced Open Collaboration Environment will provide a set of tools for third-party developers to use in developing E-mail and other applications that depend on sending messages back and forth. The OMI-compatible tools (see previous bulletin), which will be incorporated in an upgrade to System 7, provide messaging, directory services, and privacy and security controls. Apple said it will describe specific products early in 1992. It is not clear whether Apple will market end-user software or stick to providing tools for other developers

Adobe Chip Makes Printers Real-Time

Adobe Systems has designed a chip that makes PostScript text imaging so fast that the limiting factor when printing text will be the rated engine speed of the printer—at last. Called the Adobe Type 1 Coprocessor, the chip contains Adobe's standard font-rendering algorithms, which run much faster on the chip than the usual rendering in software. Adobe expects third-party vendors to offer printers that use the chip sometime in the first half of 1992. The company said it is also working on coprocessors that will accelerate other parts of PostScript.

HP Cuts Price of DeskWriter

Hewlett-Packard has reduced the list price of its popular DeskWriter monochrome ink-jet printer from $729 to $599. Contact HP at 800/752-0900.

Apple Announces ISDN Board

Apple will ship in November its ISDN NB Card, a NuBus board that interfaces with the Integrated Services Digital Network (ISDN). ISDN is a public wide-area network that's an emerging standard for local and international exchange of voice, video, data, graphics, and other forms of information. ISDN can transmit up to 64Kbps. Apple's board will list for $1099. Contact your Apple dealer.

One Piece of a PIM

From two of the early developers of FileMaker comes In Control, a to-do list for managing appointments and deadlines that eschews the calendar interface and contact list of similar products. In Control displays information in a multiple-column outline format that can be sorted by priority or urgency and sifted through with a variety of searching tools and calculations. It lists for $129.95. For more information, call Attain Software at 617/547-2188.

QMS Cuts PostScript Prices

QMS has dropped the prices of some of its most popular PostScript printers by 6 percent to 22 percent. The QMS-PS 410, QMS-PS 815, and QMS-PS 825 printers, which can sense whether an incoming file is PostScript or PCL, now list for $2395, $3995, and $4695, respectively. Those three printers have been the subjects of controversy because of problems that QMS says are solved in new units, and because of differences between the PostScript on their controllers and other versions of PostScript (see *MacBulletin, Macworld,* November 1991). The QMS-PS 810's new list price is $3495, while the ColorScript 100 Model 10 now goes for $8495. Contact QMS at 205/633-4300.

Multiple Master Typefaces Announced

Adobe rocked the world of type last spring when it announced a new technology called Multiple Master typefaces, which can incorporate a range of user-controllable attributes such as bold and italic in one typeface. Adobe now plans to ship its first two Multiple Master typefaces by the end of 1991. Myriad will list for $370, and Minion for $470. For more information, contact Adobe at 415/961-4400.

JPEG Compression for EPS Files

Storm Technology has devised a compression technology that will enable users to transparently compress and expand graphics as encapsulated PostScript (EPS) files. The result should be compatibility among page-layout applications, graphics software, and printers or other devices that use Adobe's PostScript Level 2. Storm expects third-party

(continues)

software developers to incorporate the technology in their applications. The company will include the capability in a new version of its PicturePress JPEG compression software, scheduled for the first quarter of 1992. Contact Storm at 415/691-1111.

Farallon Ships 24-Port PhoneNet Hubs

Farallon Computing has begun shipping the PhoneNet StarController 377, its first 24-port hub. Farallon is also offering the PhoneNet StarController 357, an improved 12-port hub. Both hubs are designed to provide greater reliability and easier AppleTalk network management. Both ship with a new version of the company's StarCommand network-management software. The 24-port 377 lists for $1899, and the 12-port 357 lists for $1495. Contact Farallon at 415/596-9100.

Apple's Unit Shipments Remain High

Apple's strategy of gaining market share continues to succeed, with the company's unit shipments up 60 percent for the fiscal year ending September 27, 1991, over the previous year's shipments. For the fourth quarter unit shipments were up 50 percent over units shipped in the same quarter the previous year. As expected, Apple reported lower profits on higher sales revenue.

The List of Books

The bibliography-generator Pro-Cite has been upgraded to version 2.0. New features include the ability to search for references in a word processor document and automatically create a bibliography entry from them, support for subscript and superscript characters, and the ability to export bibliographies in text-only format. It can store 100,000 records in a database. Pro-Cite lists for $395. Personal Bibliographic Software is at 313/996-1580.

Claris Enters Windows Market

Even though Claris's intentions to cut its ties with Apple were never realized, the software subsidiary has gone ahead with at least one of its independent plans: marketing non-Mac software. Claris has licensed Hollywood, a presentation package developed for Windows by Publishing Solutions and previously marketed by IBM. Claris plans to port Hollywood to OS/2, but would not comment on its Mac plans.

Tool Kit for Resolve, Wingz Hackers

Spreadware has developed Toolbox to help spreadsheet users write sophisticated scripts for Wingz and for Claris's Wingz-derived Resolve. Using Toolbox, scripters can create applications by adding dialog boxes, text fields, menus, and so on, to worksheets. Toolbox provides more than 80 functions for formatting, controlling, and printing, as well as manipulating numbers. It lists for $89. Spreadware is at 619/347-2365.

New Networking Products Announced

International Transware has announced several Mac networking products. The SerialWay is a three-port, stand-alone hub for users dialing in to AppleTalk networks with Apple's new Remote Access (see *Macworld News*, December 1991). The SerialWay lists for $499, or $999 for the Ethernet version. TransTalk is a router that connects multiple LANs into a single WAN. It has hardware compression, includes network-management software, and supports both asynchronous and synchronous communication. Priced at $899, TransTalk also supports Hayes's ISDN System Adapter, essentially an ISDN modem bridge. InterTalk is a LAN router that incorporates direct memory access for greater speed; it costs $599. A $399 NuBus board version of InterTalk that uses the Mac's power supply but has its own memory and processor, is also available. International Transware is at 415/968-8888.

Radius Unveils 20-Inch Color Monitor

The PrecisionColor Display/20 from Radius is a 20-inch color monitor that works with a wide range of display adapters and Macintoshes. When attached to a Radius PrecisionColor display adapter, the Display/20 can change resolutions on the fly for an enlarged view, or for displaying several pages at once. The 24-bit monitor meets Swedish MPR2 guidelines for magnetic emissions. It is currently shipping for $3229. Contact Radius at 408/434-1010.

MicroNet Raven Drives for Quadra

MicroNet Technology has introduced versions of its Raven high-speed disk array that work inside the Macintosh Quadra 900. Called the Micro/Raven040, the series ranges in capacity from 606MB to 2700MB, depending on the capacity of the two drives in the array. The 606MB version of the Raven lists for $6390, while the 2700MB version lists for $13,890. The company also introduced Micro/Mirror high-capacity disk-mirroring systems for the Quadra 900. For more information, contact MicroNet at 714/837-6033.

Multi-Ad Creator Revised

The Mac's only tool designed specifically for laying out advertisements is being upgraded to version 3.0. Multi-Ad Creator 3.0 adds support for Pantone and Focoltone colors, trapping, and such serious prepress concerns as control of ink coverage and undercolor removal. Multi-Ad Creator lists for $895. Multi-Ad Services is at 309/692-1530.

Privacy in the Workplace

The Electronic Mail Association has published a 36-page guide to help employers formulate a coherent policy on the privacy of employees' electronic mail. The EMA is charging $45 for the document. For more information, call the association at 703/875-8620.

WHEN WAS THE LAST TIME A DRAWING PROGRAM MADE YOUR PALMS SWEAT, YOUR PULSE RACE, AND YOUR HEAD SPIN.

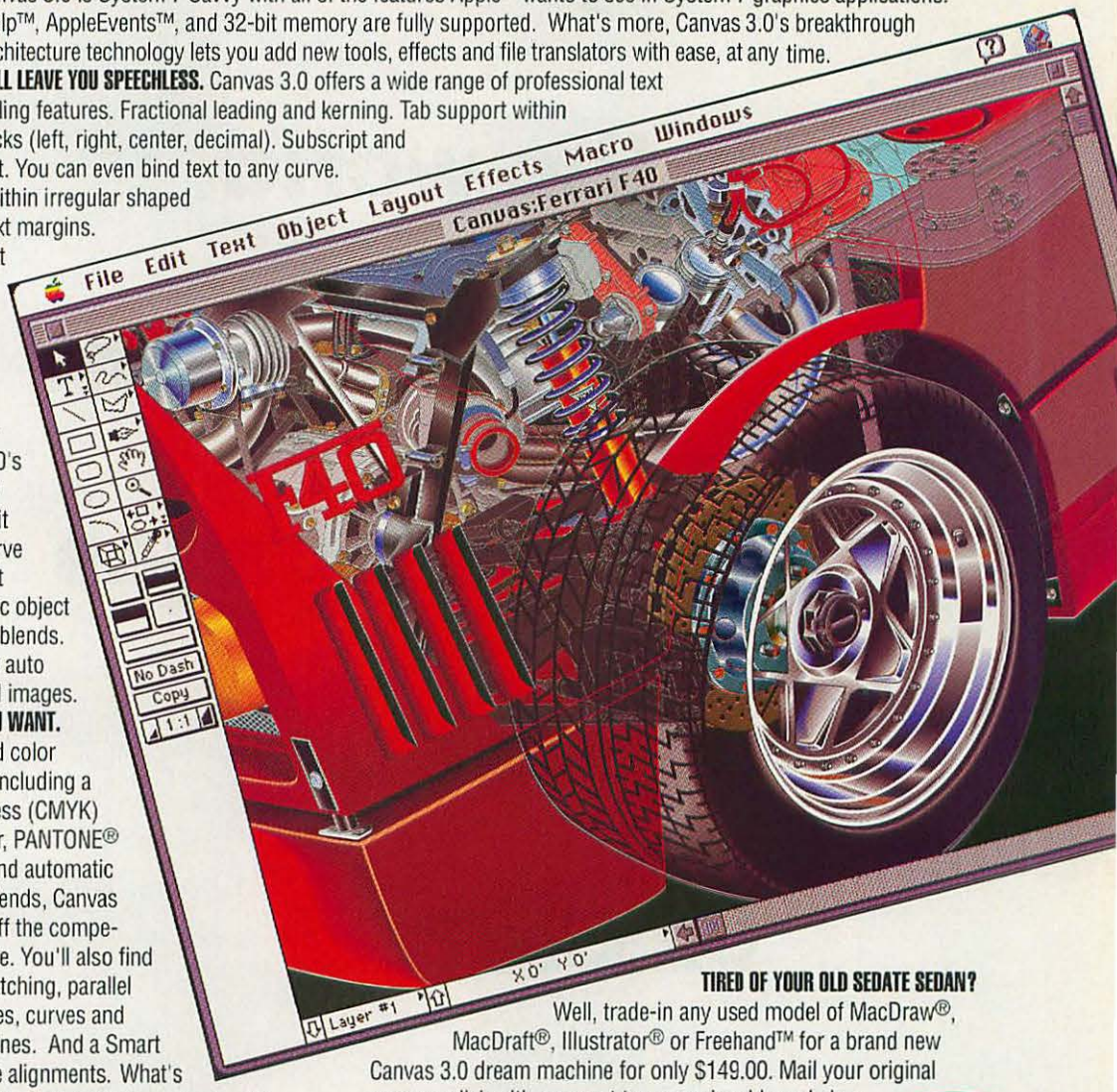
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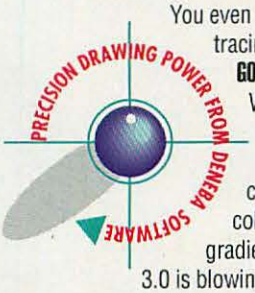
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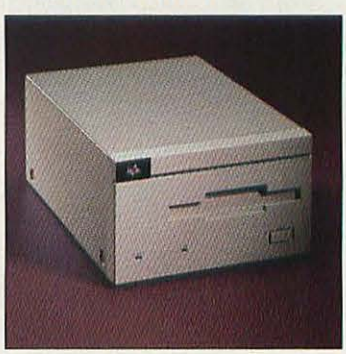
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Portability with a purpose.

So maybe you're a skeptic. And you're thinking that PocketDrive, being as small as a billfold, must somehow skimp on performance.

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And when you consider its all-new 2½ inch drive technology, fast 19ms seek time, plus the quietest operation this side of a mime troupe, it's clear that PocketDrive really gives you maximum performance in a minimum of space.

*Also available with 40MB.

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You've heard that compact drives are a pain to connect and disconnect? Not anymore. Instead of plugging directly into the back of your Mac,* PocketDrive connects to a cable called PocketDock.™ No more fumbling around at the back of your computer, connecting, disconnecting and reconnecting everything. And when you buy an additional PocketDock cable, you can leave *one* cable at work and *one* at home for even faster set up.

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And with PocketDrive, you also get Silverlining.™ Acclaimed as the most powerful hard disk management software in the industry, Silverlining's set of utilities maximizes the performance of SCSI drives like no other. In fact, MacUser was so impressed, they named Silverlining one of their *200 Best Macintosh Products.*

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"The choice is clear... buy the La Cie scanner."
Macworld, June 1991

"My recommendation would be to go with La Cie Silverscanner and Photoshop..."
MacDigest, December 1990

"La Cie's Photoshop plug-in offers more options than almost any other software."
Publish, August 1991

Now that you've seen what they've said, see what they mean.

When the subject is scanners, seeing is believing.

So, to see what the critics are raving about, we thought it wise to show you just how good La Cie looks compared to the competition — in this case, the Microtek 600ZS.

The result? When you compare the two images side by side just like the experts did, La Cie's Silverscanner™ beats Microtek.

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When Macworld recommended buying the La Cie scanner, they must have had some very good reasons in mind.

Maybe it's because we offer the finest, most reliable hardware in the industry.

Or that the Silverscanner delivers the kind of superior performance usually found in machines costing thousands more.

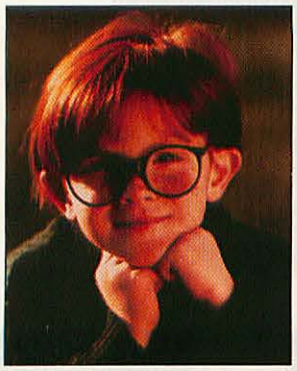
Or the fact that you get high-quality, true-to-life color. Sharp, accurate scans. Production-quality halftones with excellent detail in those troublesome shadow areas. Plus easy-to-use image controls, with full functions such as user-selectable halftoning, color dropout, gamma correction, brightness and color correction. All right at your fingertips.

Faster previews, faster scans.

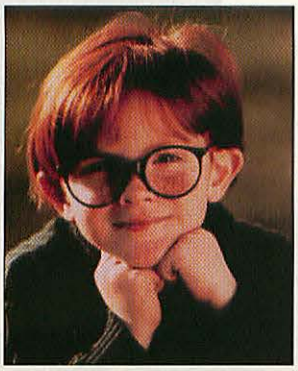
If you've ever used a scanner, you know what it means to wait for the entire preview to finish before you can make any adjustments to your scan settings. It's a process that can burn up a lot of your time.

But thanks to our single dynamic preview window, you can modify your scanner functions *during* the preview. That means no more waiting around for the preview to finish before making your scan settings and starting your final scan. Suddenly, your previews take seconds instead of minutes.

In fact, the Silverscanner is so fast — and will save so much time — you can often finish your scans *before* other scanners are even finished previewing.



Microtek Scan



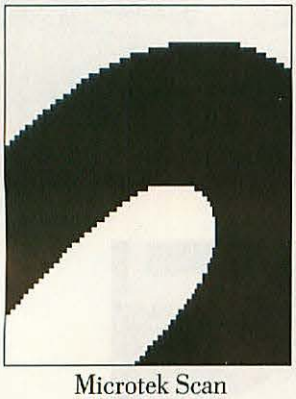
Silverscanner



Microtek Scan



Silverscanner



Microtek Scan



Silverscanner

For this comparison, we used a Microtek 600ZS and a La Cie Silverscanner. All scans were done at default settings with no corrections. The color images were separated using Adobe Photoshop. The top of the letter "C" in the La Cie logo was scanned at the maximum dpi setting (600 dpi on the Microtek 600ZS and 1200 dpi on the Silverscanner) and was enlarged so you can more easily see the difference. See the La Cie logo below scanned at 1200 dpi at actual size. You compare, you see the difference, the La Cie Silverscanner — better color, more shadow detail and smoother line art.

The hardware is great. The software is priceless.

The Silverscanner also comes with a great software package. And not some bargain-basement throwaways, either.

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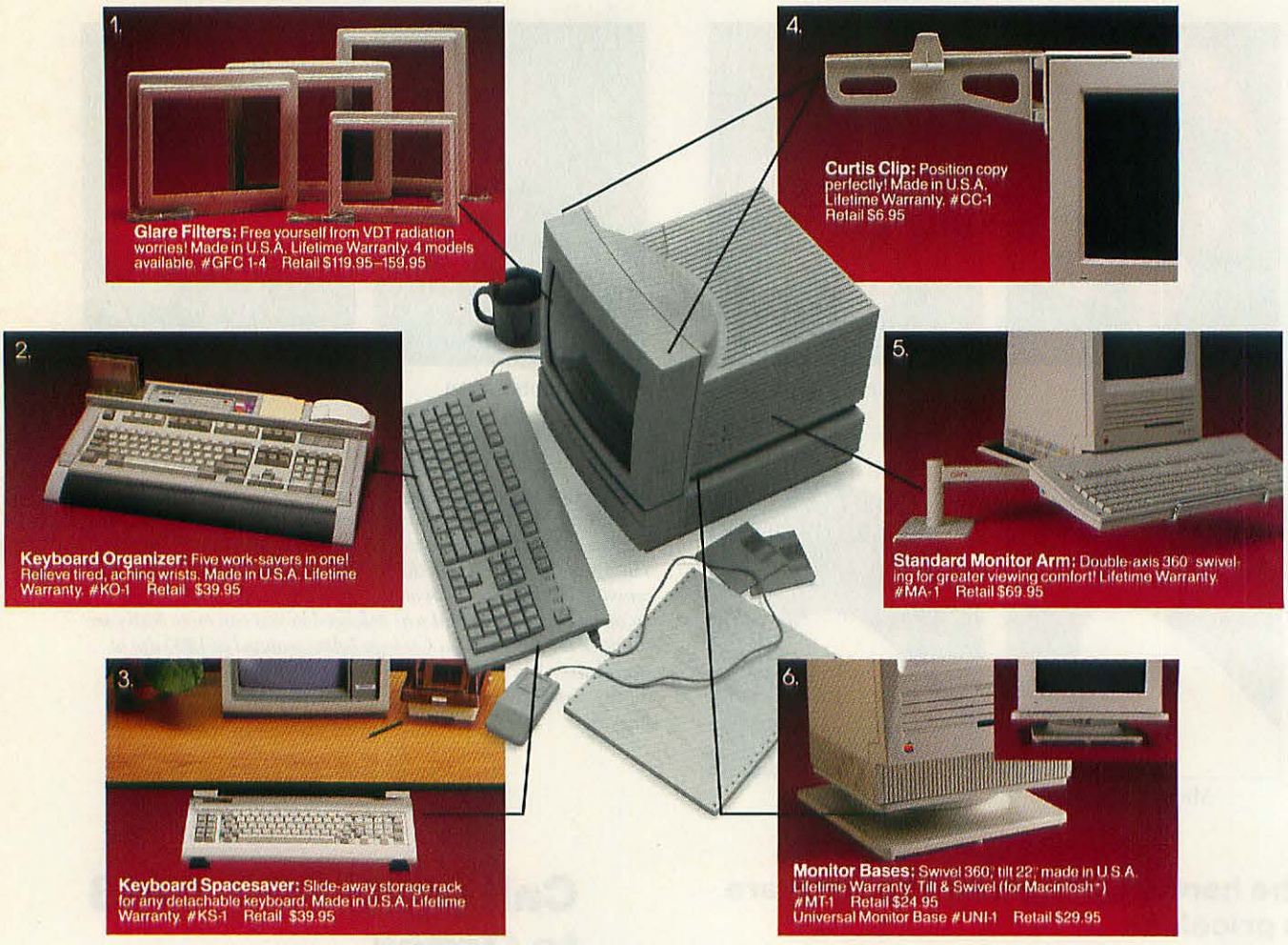
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Circle 20 on reader service card



A Tool for the Mind?

OF THE MACINTOSH, DEVELOPERS, AND HISTORY

BY JERRY BORRELL

Last month in this space I wrote about the experiences of a research engineer who designs scientific instruments on personal computers. It was a revelatory discourse on why the Macintosh has not succeeded in areas such as computer-aided design. That column, and the PBS documentary "Columbus and the Age of Discovery," with its explanations of how the world was shaped by events of the Middle Ages, caused me to reflect upon whether the Macintosh is one of the tools for the mind that are shaping the world and our culture.

The truth is that the Macintosh—there are more than 5 million of them now—has had and is continuing to have an impact on the way many of us think and work. But the PBS series caused me to question whether this little computer's legacy will be significant or just a blip in the history of the world. The question has immediacy for me because as the editor of *Macworld* I frequently meet with individuals in the Macintosh developer and user community.

I think of Macintosh developers as the equivalent of those users of newly translated Arabic texts on science and medicine referred to in the PBS documentary—those who brought scientific method to European cultures, thereby initiating the Renaissance. Or I think of Mac developers as people who are applying new technology to traditional tasks, thereby changing society—or in this instance, changing the ways in which the Macintosh can be used.



ERIC MILLETTE

Once one of the Mac's best developers, Jim Rafferty today is bringing multimedia capability to Windows-based PCs.

What Direction for Developers?

Over my six years of writing (this is my 65th monthly column) and working at *Macworld* I have followed the growth and change among Macintosh developers as avidly as a historian. I have listened to those who became Mac developers for the profit, to those who love the Macintosh, and to those who fit both categories. I continue to meet with entrepreneurs who have succeeded, with executives who have left the community, and with those who are making second or third attempts at becoming Mac developers. They are the most learned, cosmopolitan, fascinating group of computer engineers and scientists one can imagine. Their wit and imagination translates into products that delight and serve Macintosh users well.

As I reflect upon their work today, I recall one thought frequently voiced by developers: whether they can continue to be Macintosh developers. Radius is one of the few public companies to have risen out of the Macintosh development environment. Company president Barry James Folsom reminded me of a recent conversation he had with Bob Puette, president of Apple USA, in the aftermath of Apple's announcement that it would sell a 21-inch color monitor in the United States. To paraphrase, Folsom told Puette that he understood Apple's decision was based on business; similarly, Radius had made the decision to place 50 percent of its research dollars into developing products for the IBM PC/PC clone market rather than for development for the Macintosh.

(continues)



Circle 258 on reader service card.

Dan Schwinn, CEO of Shiva Corporation, told me recently (another paraphrase) that Apple simply makes it ever more difficult to develop products for the Macintosh. In the same conversation, Schwinn said that Shiva too was investigating how to sell products into other computer environments, although for a networking company this is a natural expansion of the market.

Nothing New

Not that arguments over developer loyalty are a new event. One day four years ago I was sitting in the office of Jim Rafferty, CEO of Cricket Software at the time, when he received a 40-minute call from an Apple director berating him for beginning to develop Windows products. Cricket is no longer in the marketplace, perhaps partly because of too-ambitious investments into Windows development. But in general, Rafferty preferred the Macintosh as a development platform. He often put his Mac programming team through nightmarish development hoops in order to please Apple or to get out the next important Macintosh product. Today he is involved in moving QuickTime-type technology to the PC platform. One of Apple's best developers has become one of the competition's best developers.

Some developers have succeeded in part because they established themselves on the Mac and then made the leap into the larger, more competitive, PC marketplace. Aldus, developer of PageMaker, started on the Macintosh. I recall warning Aldus's president, Paul Brainerd, years ago that if Aldus were to pursue DOS development, the company's Macintosh development would slow. Indeed, Macintosh development has slowed, but Aldus is a larger, more profitable company today because Brainerd decided to sell products into a non-Mac market.

You cannot blame company presidents for taking what they perceive is the best course to success for their company. The issue I raise is whether Apple, in not more aggressively pursuing and supporting its developers, is not only ceding important product development to its competitors, but also losing the battle for computer users' minds by not having important new products appear first on the Mac.


ERIC MILLETTE

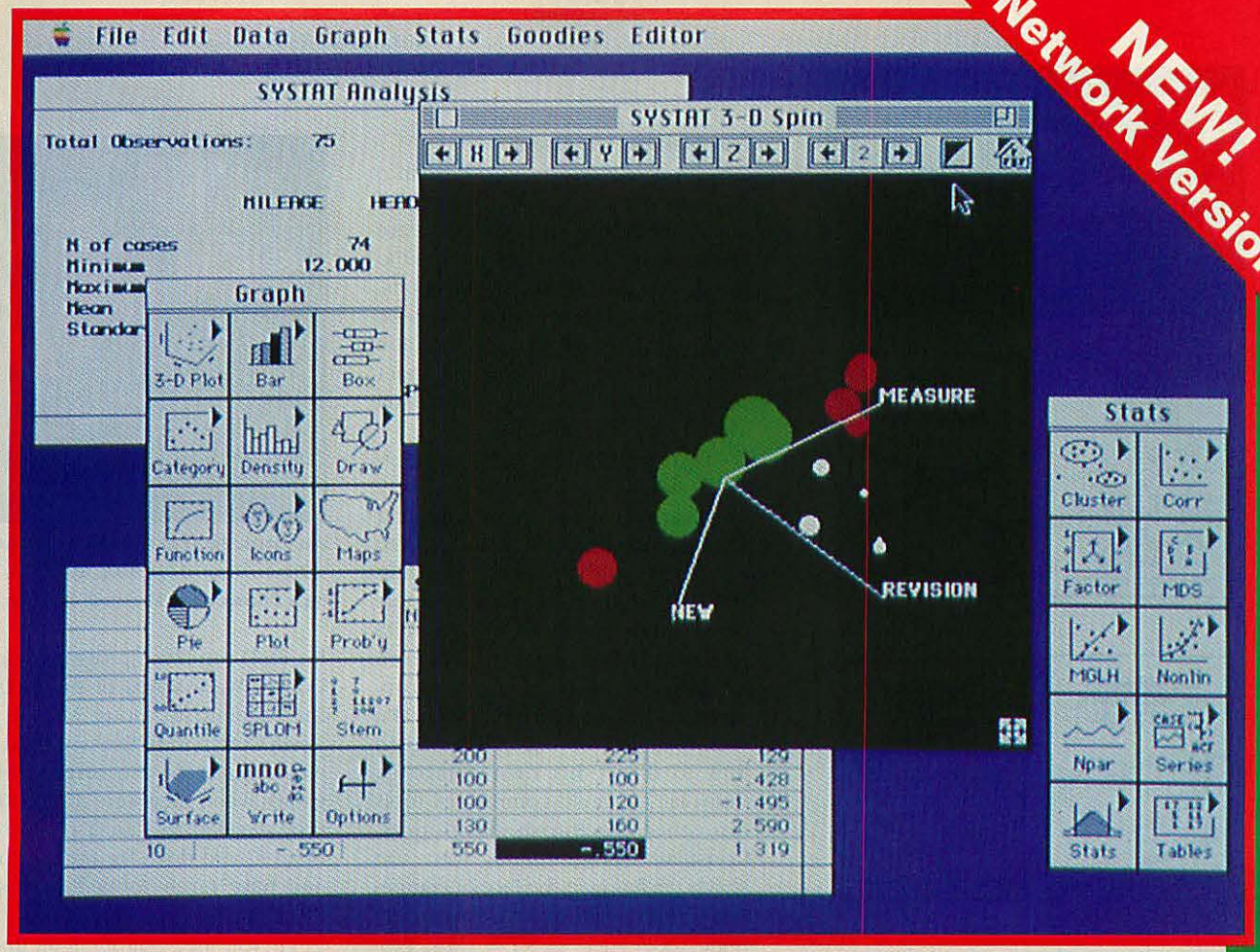
Bill Duvall was one of the early experimenters in hypermedia at SRI. Why isn't this man contributing to the Macintosh?

In some ways the Apple developer environment is similar to one of those nation-states, discussed in the PBS documentary,' that the Catholic Church dominated in the 15th century—scientists had to either leave or hide the nature of the work they were doing for fear of persecution. The analogy is hyperbolic with regard to the severity of the persecution, but apt in terms of the ability of scientists to work in an environment conducive to their growth and development. Fewer talented developers seek to make a difference only through the use of the Macintosh.

Developers share several common factors. There are few Mac-only developers today, unlike in the past. More products are sold by fewer companies—Microsoft, Aldus, Adobe, Symantec, and Claris dominate Mac software sales. Often, development cycles on Mac products are held up due to development needs for the Windows version of the products. Macintosh developers entering the market almost always have a vision of developing products for other computers as soon as they can. Developers who have to divide their resources to work on several different computers necessarily work slower and tend to develop with less ability to take advantage of each computer's unique strengths. Innovation is slowing across the product market.

(continues)

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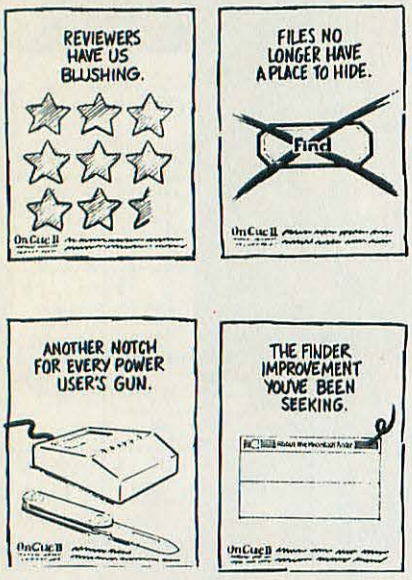
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Tool Makers, Tool Users

Developers for the Macintosh fall into two primary categories: those who make tools for others to create Macintosh applications and those who use these tools to build applications. Among tool makers I point to people such as Bill Duvall of Consulair and Paul Smethers, both of whom spent years working to build programming tools for the Macintosh.

Duvall, a Silicon Valley wunderkind, worked at SRI (with Doug Engelbart on the original hypertext system) and at Xerox PARC (where Duvall did some of the first non–Latin alphabet work on computers). Apple contracted Duvall to create MDS (Macintosh Development System), Apple's first programming environment for Macintosh developers. The rocky path of working with Apple led him to direct his own company, Consulair, to build commercial tools for other Macintosh developers. Consulair's programming tools are slowly declining in the face of competition from Apple-supplied programming tools such as MPW (Mac Programmers Workshop). Duvall is one of those talented computer-systems engineers who love the Mac and want to help it along, but can't seem to find a way with or without Apple to aid the process. He recently resigned from Claris as the director of engineering for HyperCard.

Then there are the tool users, those who take a newly designed sextant and circumnavigate the globe. You have to look with wonder at some of the people who have become Macintosh developers: Reese Jones dropped out of the doctoral program in biophysics at the University of California at Berkeley in order to found Farallon Computing, a $50 million–plus networking company. Dan Feldman left a career in mathematics to found Abacus Concepts, a Berkeley, California–based company that is the principal seller of statistics tools for the Macintosh. Allan Bonadio of Prescience Corporation, another wunderkind, decided he loved the Macintosh and wanted to develop mathematics programs. Chad Mitchell, cofounder of Great Wave Software, slowed his doctoral work at Stanford University (he has since completed his Ph.D.) to finish programming the ConcertWare series of products for the Macintosh. Doug Macrae and Kevin Curran were two whiz kids who wrote some of the original video games when they were at MIT. Then they decided to start a company to build a hard drive for the Macintosh and have rarely looked back since founding GCC Technologies.



ERIC MILLETTE

Joe Sparks, the VP of engineering at Reactor and codeveloper of Spaceship Warlock, is making a difference as a Macintosh developer.

If you methodically look around the Macintosh developer community, you find a truly marvelous crew. Examples include Mike Saenz and Joe Sparks, the duo at Reactor who developed Spaceship Warlock. I cannot escape comparing these two to Steven Spielberg and George Lucas early in their careers. Tool users who are destined, if they remain Mac developers, to appear on the national scene in the 1990s as the new gurus of digital media. Saenz reminds me of Vesalius, the 16th-century Renaissance man of Italy, who against all teachings of the Church decided to sneak corpses out of graveyards to develop the first comprehensive catalog of anatomical drawings, thereby contributing to modern medicine.

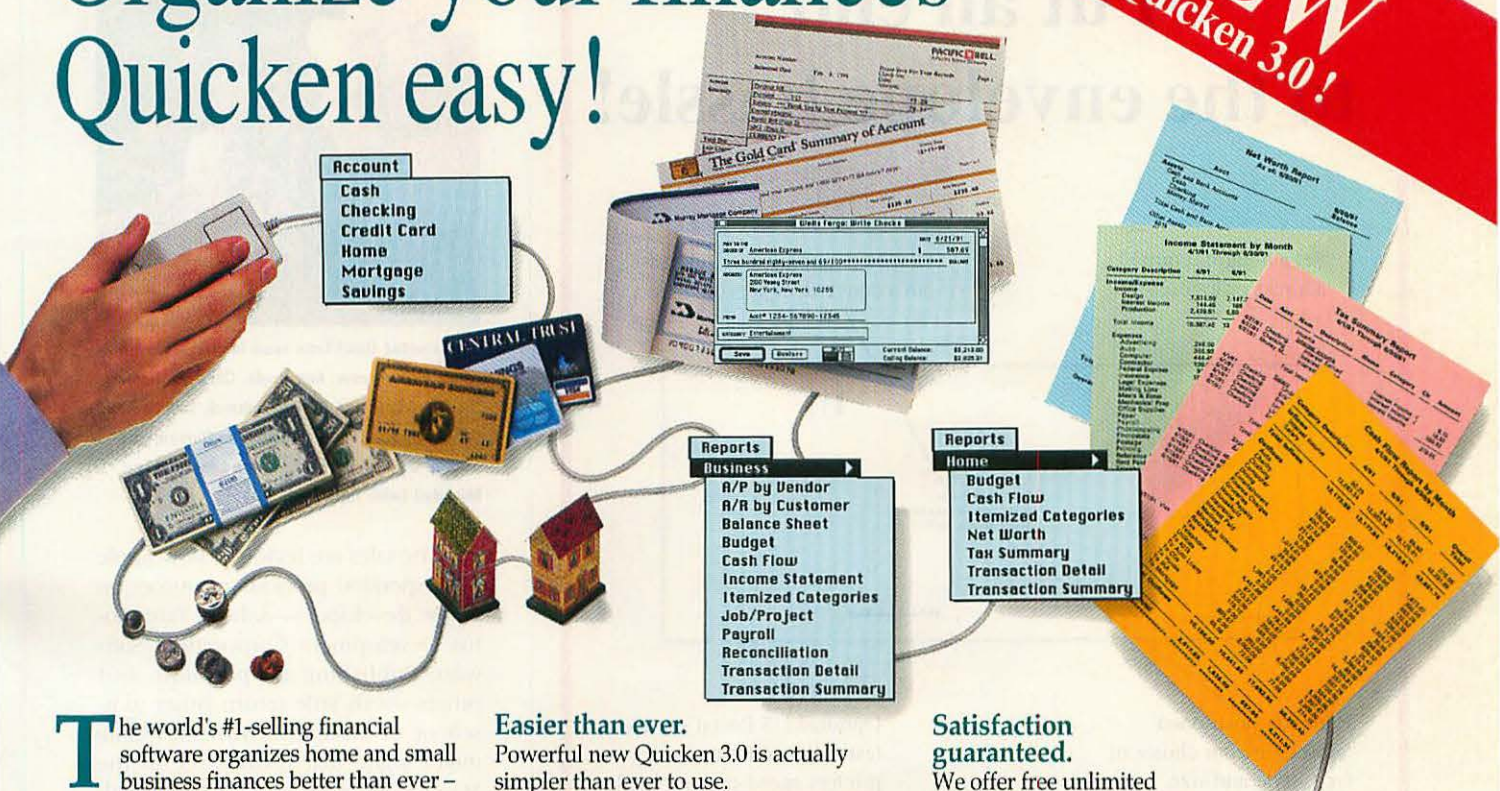
Does Apple Encourage Tool Makers?

Back to the analogy of the Middle Ages and the question of whether Apple plays the part of Rome (that is, we will OK navigation of the globe if we think that more pagans will convert to Catholicism) or the part of the Spanish Crown (if you question the established order, you will be punished).

(continues)

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ROBERT HOLMGREN

The talented QuickTime team includes, from left to right: Back row: Ken Doyle, Chris Thorman, Mark Krueger, and Gary Woodcock. Middle row: Sean Callahan, Peter Hoddie, Jim Batson, and George Cossey. Up front: Bruce Leak and Lee Mighdoll (with flamingo).

The tales are legion of how Apple has expended precious resources on major developers—Ashton-Tate, Lotus Development Corporation, Software Publishing Corporation, and others—with little return either to itself or to Macintosh owners. (Some might argue that Lotus 1-2-3 for the Mac will change Lotus's history with the Mac.) Small developers deprived of communication, support, or early seeding of product from Apple are particularly hurt.

Apple's software subsidiary, Claris, which always causes Mac developers to question why they should make the effort to compete, will soon add another question mark for developers. Like Sun Microsystems and Next, Claris intends to establish a software publishing arm to help bring smaller companies' products to market. Done properly, this could be a boon; done poorly, it will hurt Mac developers.

Finally, there is the bulk of Macintosh developers, a group of companies with annual revenues of $1 million to $5 million each. Members of this group increasingly look at the Macintosh as a platform for growth as a company before they enter the IBM PC and PC clone market. Paul Topping, president of Design Science, said that after years of developing for the Mac, his small company has succeeded in the IBM PC market. Creating products that can run on multiple platforms is now "a major factor, if not the major" influencing factor for future

(continues)

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product development, Topping said. He continues to believe in the Mac, the device of preference within the company. But as differences between Windows and the Mac interface dwindle, developers feel they must look toward the larger Windows marketplace. "Business is business," said Topping; in other words, his company will build products in whatever environment they can succeed in.

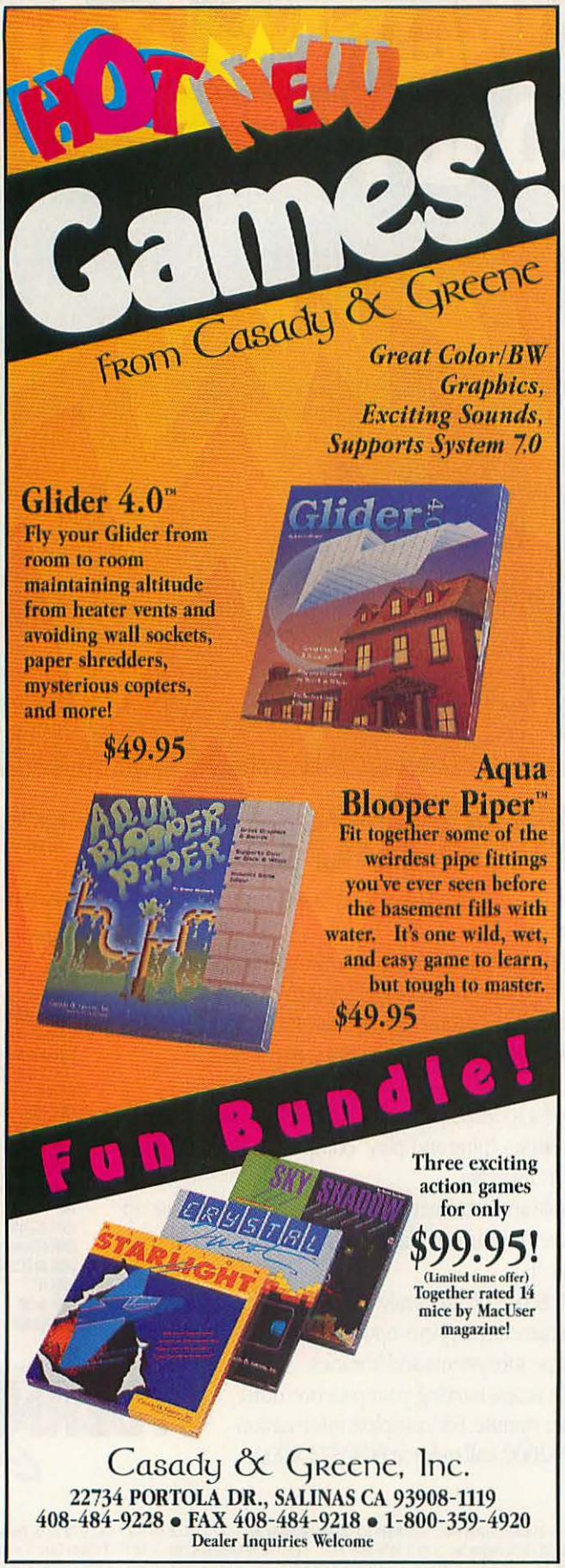
A few developers like Abacus await better tools to move their software to other platforms, but clearly there are almost no exclusive Mac developers left in this industry. Peter Norton Computing, now a part of Symantec, produces Norton Desktop for Windows, which all but makes Windows 3.0 a clone of Apple's System 7.

Apple as Venice

At the same time, Apple over the years has become a kind of haven for very talented software and hardware engineers. Within the confines of its various engineering or advanced research organizations are people who can make a difference.

You may have noted my enthusiastic support of QuickTime over the last several months. That groundbreaking product will ship in December and January. A similar version for IBM PCs and PC clones will ship early next year too—never has Apple had more competition in the products through which it attempts to distinguish itself.

John Sculley announced at a recent conference in Japan that before the end of 1992 Apple would have a computer with a built-in CD player. Dear John, too little too late. Better work on the serial port on the back of the Mac and make it ready to accept ISDN-speed communications—that's where the rest of the world is headed. Better speed up the graphics performance of your machines. Better ensure the Mac can support 3-D graphics. Better not give source code to IBM via your new multimedia joint venture, Kaleida. Apple's role in innovation is dangerously close to disappearing. You can't lock up QuickTime forever, but for now Apple is like a ship's captain with a complete set of charts that no one else possesses. Where are you headed? M



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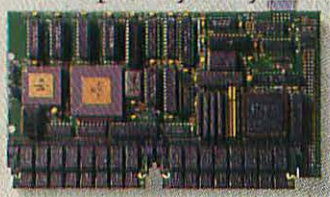
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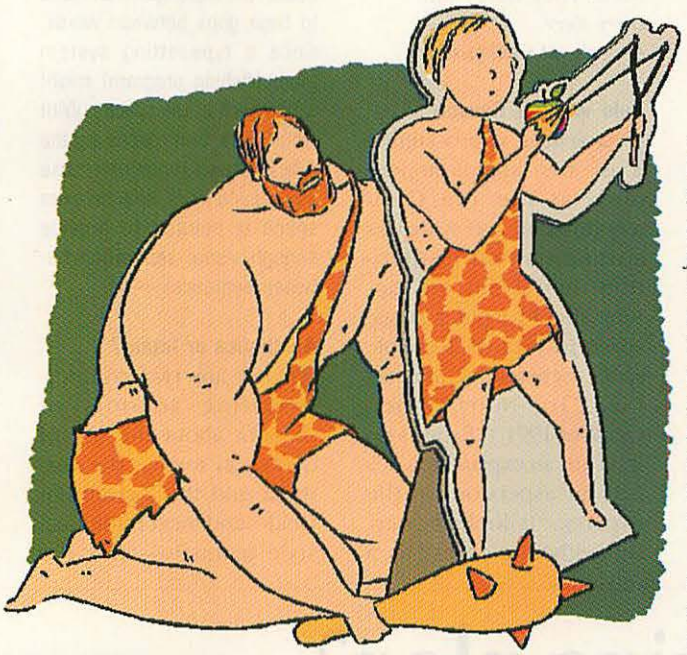
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LETTERS



Practicality, Not Myth

Like many Macheads, Steven Levy has evidently found great personal satisfaction in rooting for the underdog (*The Iconoclast,* October 1991) in the David-versus-Goliath mythology so cleverly created and exploited by Apple in its imaginative television and print advertising over the years.

Then again, we Americans do have an ugly penchant for attempting to buy self-image and status with the money in our wallets rather than with self-examination and real accomplishment. I can do without the glittering mythology.

Eric Tamm
El Cerrito, California

More Than a Product

Now I find Apple allied with Big Blue, and *Macworld* running a two-page IBM advertisement (October 1991). It stinks of treason most foul.

Apple was supposed to be the computer company that existed to put technology in people's hands. Now, with this new alliance, it has become just another yuppie hellhole: greedheads who couldn't give a damn about anything beyond the next quarterly report. They've targeted the corporate world, and abandoned the true believers.

T. C. Lynch
Staten Island, New York

WARD SCHUMAKER

Open Technologies

I see no harm in a practical Apple-IBM alliance. While I'm skeptical that this limited partnership will revolutionize computing in the future, I look forward to the day when Apples and IBM PCs can talk to each other seamlessly and quickly. The "rest of us" have businesses to run and do not have the time to contort our Macs into communicating with the other 85 percent of the computer world.

It is Apple, not IBM, that litigates at the drop of an icon; and even Levy's high priest, Steven Jobs, refused to allow anyone access to the inside of the early Macintoshes so as to perpetuate his monopoly. If this is the dream that's being lost, give me reality anytime.

Joseph Braff
Shrub Oak, New York

Fear of Inertia

Apple's initial premise was to make computers useful for the average person. It succeeded brilliantly in that mission, not only with its own computers but by the influence it had on other manufacturers, most notably IBM and Atari.

The fact that IBM has teamed with Apple to create a new generation of computers does not threaten me. Mac users cannot live in fear of change. Change is what we were trying to do in the first place.

Susan Forney
Richland, Washington

Evangelizing IBM

This IBM ad is an outrage! I called the ad's 800 number and said, "I challenge you to find one person or organization that has ever switched from us-

(continues)

Corrections

Signals in an active star are routed to all branches, just as in a passive star ("Building a Better Network," November 1991). The main difference between active and passive stars is that in an active star the signal is boosted through the star controller, which allows a longer network.

*The correct phone number for Fractal Design Corporation (*Where to Buy, *November 1991) is 408/688-8800; the fax number is 408/688-8836.*

A defective Typist unit was used to compile the results listed in "OCR: Teaching Your Mac to Read," November 1991. Correct accuracy results for the Typist are:

Typewriter: 15
Press Release: 33
Fax: 217
Mailing List: 34
Contract: 1984
Magazine Story: 102
Average: 398

The statement "both hand-held recognizers ranked among the least accurate programs tested" is not correct. The Typist finished ahead of Scan-Reader, TextPert, ReadStar II, and Read-It Personal. In retesting, The Typist was able to recognize a second-generation fax.

Great Plains Account-

(continues)

ing ("Straightforward Accounting," November 1991) uses standard Macintosh dialog boxes in all of its modules.

*DesignStudio 2.0 allows users to search and replace most text attributes, and to create a box and select it with the content tool and the ⌘ key (*Reviews, *November 1991). Positioning page elements, alignment, grouping, step-and-repeat duplication, object-locking, nonprinting, and the ability to set the text to pass through to the printer as PostScript were also present in earlier versions of the program.*

*VersaCAD Corporation was incorrectly listed as Versa Corporation (*Commentary, *December 1991).*

ing the Macintosh exclusively to an IBM PS/2 exclusively. Of course, if you do find someone, they probably traded in their Honda for a Yugo." I waited five days for IBM to call me back. They never did.
Gary Kerr
Beverly, Massachusetts

Rule without Reason

I have seen it proclaimed as often and as imperiously as the Ten Commandments, and with less attribution and justification, and I am fed up. Why should I put a single space instead of a double space between sentences? (See "Top-Notch Type," October 1991.) "Experts do it" is not an explanation, it's just an aspersion on the experts. "It looks better" isn't either; to a lot of us, a double space looks better.
Grant Schampel
Saint Paul, Minnesota

The main reason is to avoid overly large gaps between sentences. In justified type in particular, the extra space can lead to huge gaps between words, since a typesetting system (or publishing program) might widen each of the spaces. With typewriters, two spaces are the rule because typewriters use monospace fonts, and the extra space is needed to provide enough visual separation between sentences.—Ed.

Aesthetics or Intent?

There are two countervailing schools of thought about the use of quotation marks: the aesthetic and the logical. Jim Heid—and most traditional style manuals—cites the aesthetic approach. I defy you to convey a precise meaning using the aesthetic approach to punctuation. Consider, for example:
Did you say "Do it again."?
Did you say "Do it again?"?

Despite an uphill battle against the traditionalists who write style manuals, this logical approach seems to be gaining significant ground.
Richard Russell
Madison, Wisconsin

No Talent Algorithms

In his article ("Top-Notch Type") Jim Heid hit the nail on the head, but not nearly hard enough, when he mentioned the growing trend of typesetting being performed by those who lack the training of a typographer. Corpora-

(continues)

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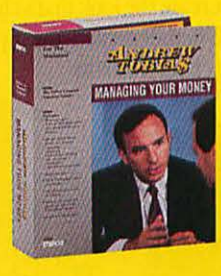
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tions have increasingly focused on becoming more profitable, leaner, and meaner. Unfortunately, their misguided efforts have led to putting a Macintosh in front of untrained clerks and giving them the title typesetter/designer/publications/advertising specialist. Substandard graphic materials have become more the rule than the exception.

No algorithm will be written in the foreseeable future to simulate the skill and an eye for composition.

Bill Jennings
Placentia, California

Prepress Clarified

As a principal of a large full-color printing company with a CEPS system, I am constantly bombarded with questions from clients who have been oversold on DTP. Your article ("The Prepress Edge," October 1991) goes a long way in clarifying the interface jungle and is the most readable treatise on the subject I have seen to date. Upon inspection few things in life are as simple and inexpensive as they appear at first glance. High-end color on the desktop is no exception.

Jerry Bray
Glen Burnie, Maryland

DTP Oversimplified

Your article "The Prepress Edge" is a shoddy attempt at explaining a very complex process.

The screen angle issue is far more complex. First of all, the traditional angles are 45 degrees for black, 75 degrees for magenta, 90 degrees for yellow, and 105 degrees for cyan. All colors are 30 degrees apart from one another except yellow because it is not a dominant color. The irrational screening techniques Joe Matazzoni mentions are sure to accelerate the quality of printing, but the traditional angles are the most tried and true. There is some suggested reading that might help: *Kiss Impressions,* by J. Tom Morgan (Technical and Education Center of the Graphic Arts, Rochester Institute of Technology, 1983), and *The Lithographer's Manual,* edited by Ray Blair (Graphic Arts Technical Foundation, 1988), are helpful in understanding printing and its history.

Carmon Madison
Columbus, Georgia

For a grid used in screens, 15 and 105 degrees are identical. Both numbers are used in industry, depending on personal preference.—Ed.

Lost Warranty

Yesterday, September 17, I went to print a document and my iDS Wip 40 hard drive started to make a disturbing clacking noise, then it whined, then it died, taking a whole passel of applications and documents with it. Purchased in January 1991—well under warranty (be it one, two, or five years)—no sweat.

I figured I'd just pack it up and send it back. I purchased it from, groan, CDA (*Conspicuous Consumer,* November 1991), so I decided to call iDS directly. Got a scratchy, incoher-

(continues)

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ent, voice-mail message that told me I'd reached iDS and put me unceremoniously on hold. For an hour.

Let me guess: iDS and CDA and Jasmine are all bankrupt, or are hiding in Colombia together.

Michelle Kienholz
Montross, Virginia

iDS is a product line that was licensed in the U.S. by Jasmine from a third party. Jasmine declared Chapter 7 bankruptcy on September 30, and CDA Computer Sales had a liquidation sale September 21 and said in a September 16 letter, "CDA expects it will be filing a bankruptcy petition in the near future."—Ed.

Speedy Mechanical Typist

In the opening of "OCR: Teaching Your Mac to Read" (November 1991), your author states that if you were to hire a typist no more accurate than the most revered OCR program, that person would be out the door. The OCR process properly includes editing the result before saving, so final accuracy is dependent upon the operator. With our interactive spelling checker, you are able to correct all errors, even those in the original text. You end up with a perfect document in one-fourth the time.

At the end, the author chose AccuText. However, his rationale for doing so concerns us. He states that although "[AccuText] can be two to three times slower than OmniPage . . . speed for accuracy is a sweet trade." This leaves the impression that OmniPage, while admittedly much faster, is somehow less accurate.

Larry Miller
Vice President, Marketing
Caere Corporation
Los Gatos, California

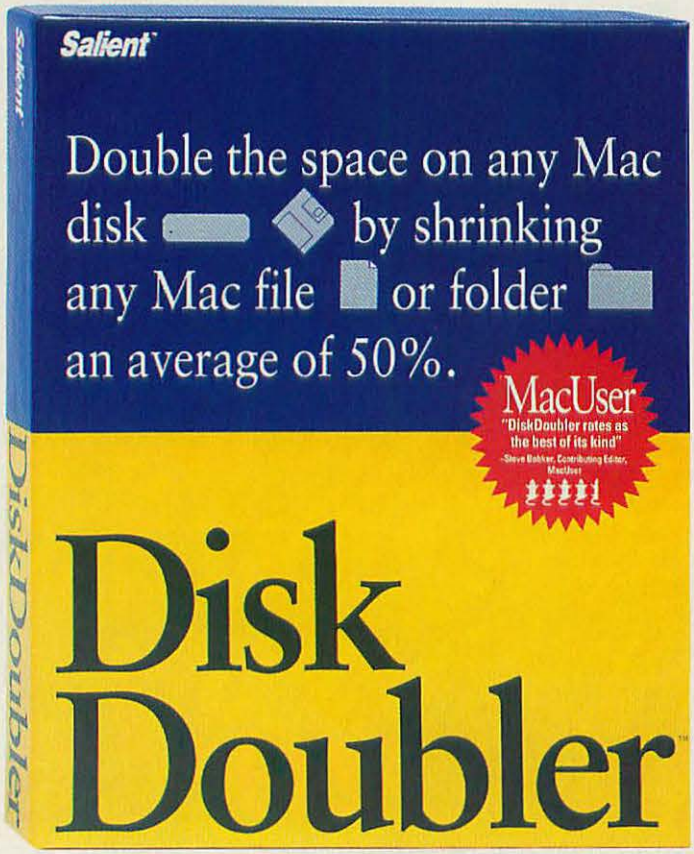
Difficult for Whom?

Looking back at the "Game Hall of Fame" in the December 1990 issue of *Macworld,* I noticed a statement that I strongly disagree with. In your description of the game Pipe Dream you stated that ". . . with 36 levels of play, the challenge far exceeds the ability of the most precocious preteen. Sorry, kids: Pipe Dream might amuse you, but it's really for adults." I am 11 years old and have gotten past level 36 on Pipe Dream. I feel that that remark was unfair to the younger Mac gamers. Despite that one statement, I am eagerly awaiting the next "Game Hall of Fame."

Andrew Fiore
Durham, North Carolina

See "The 1991 Macintosh Game Hall of Fame" in this issue.—Ed.

Letters should be mailed to *Letters, Macworld,* 501 Second St., San Francisco, CA 94107, or sent electronically to CompuServe (70370,702), MCI Mail (294-8078), America Online (Macworld), or AppleLink (Macworld1). Include a return address and a daytime telephone number. We regret that, due to the high volume of mail received, we are unable to respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of *Macworld.*



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Patricia Gallup, President.

That's right. Ordering from MacConnection on weekends won't give you sunburn, windburn, or even heartburn. Because while you're skiing and snacking, we'll be picking and packing. So any in-stock items you order on Saturday (all day) or Sunday ('til noon) will be delivered on Monday.

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We've sure been imitated a lot. But no one has ever matched our combination of price, terms, and service. And now, it looks like they'll have to work weekends to try to catch up...



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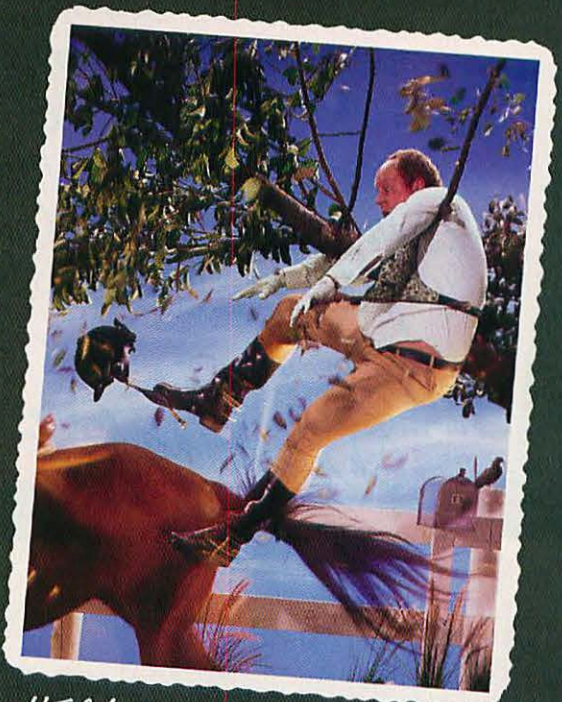
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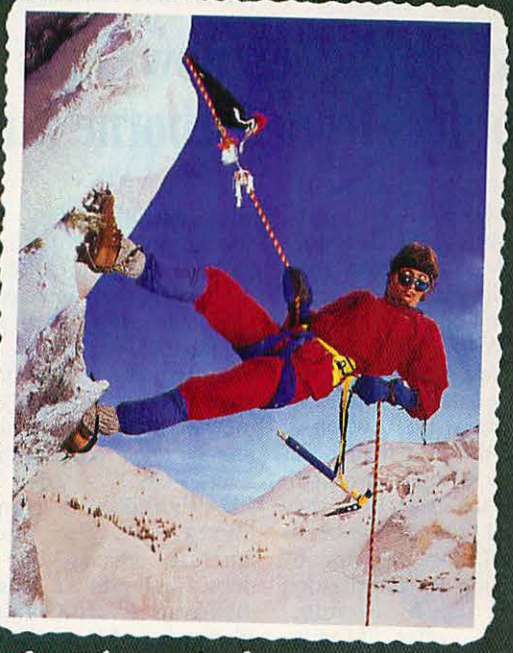
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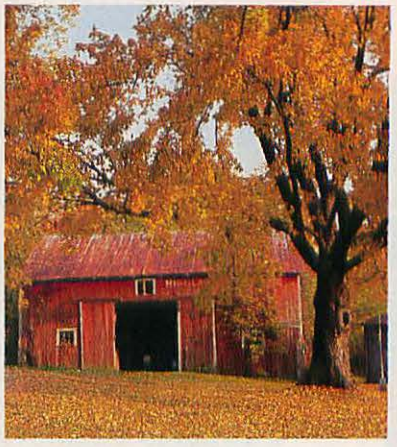
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MacConnection Is In An Ohio

Memo
FROM THE DESK OF PAT GALLUP

Last minute holiday shopping? Will be taking orders til 3:15 a.m. Dec. 24th to go out by airborne for delivery that same day . . .
Christmas Eve!



Wilmington, OH sure reminds us of our hometown Marlow, NH (pop. 568).



All those amber waves of grain make takeoffs and landings a breeze for the planes.



Start the day with a hearty breakfast and a smile from Joyce at the Silver Spoon.

MacConnection now ships all orders from Airborne hub.

MacConnection News Bureau

WILMINGTON, OH—MacConnection is now shipping all orders from their private distribution center at Airborne Express' hub airport in Wilmington, Ohio.

The New Hampshire firm has had a satellite warehouse there since 1989 when it became the first mail-order company to offer overnight shipping for $3. In 1990, they extended the ordering deadline to 3:15 a.m. And now, by centralizing its distribution at Airborne, MacConnection can offer Monday delivery of weekend orders—another mail-order first.

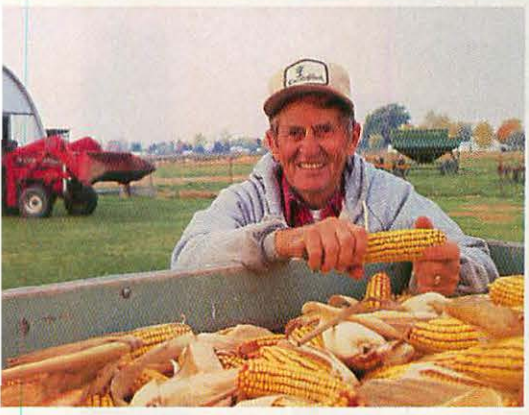
Why Airborne? Their facility has the country's only privately owned and operated Category II Instrument Landing System. There are also DC-9 and DC-8 flight simulators for training, and facilities for major aircraft maintenance on site.

In addition, a major $120 million expansion project has just begun. It will add a 9,000-foot runway, a third maintenance hanger, fourth package sorting facility, and new roadway. Construction is scheduled to be completed Dec. 31, 1994.

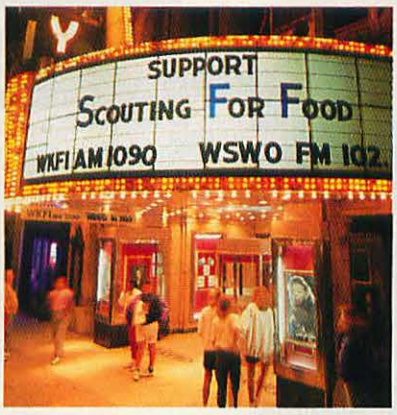
Airborne also plans to increase its fleet to 100 aircraft, create 3,000 new jobs, and add at least six buildings to its Commerce Park where MacConnection has its distribution center.

According to MacConnection President Pat Gallup, "It's another indication that Airborne is *the* airfreight company for the '90s. Thanks to them we can deliver packages faster than anyone ever has before."

BREAKING NEW GROUND CORNFIELD.



We still take your call in NH, but we ship from the land where corn is king.



Wilmington was just named one of America's Best Small Towns.

Airborne delivers. And how! 95% by noon.

By The Marlow Post-Haste

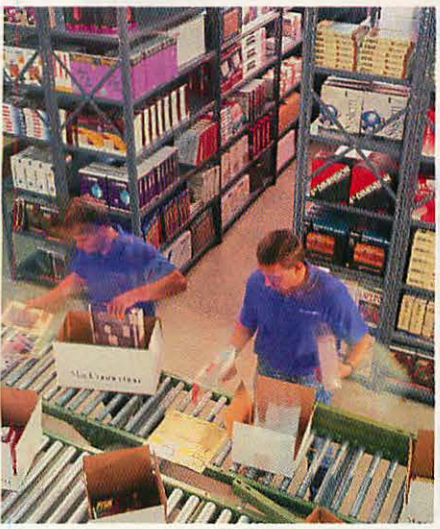
A survey of 4,000 industry participants by the International Cargo Forum recently selected Airborne Express as the Outstanding Integrated Cargo System.

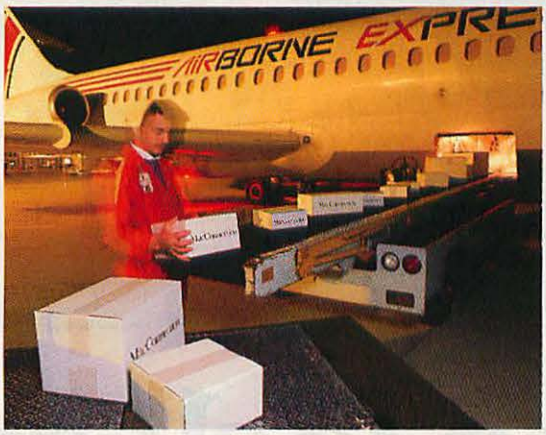
Almost 500,000 packages leave Airborne's facility every night. 95% arrive by noon and the average delivery time is 9:45 a.m.

The company also maintains one of the most sophisticated 24-hour tracking systems in the world.

Airborne Express is the third largest air express company in the industry. But they have also been the fastest growing for the last seven years.

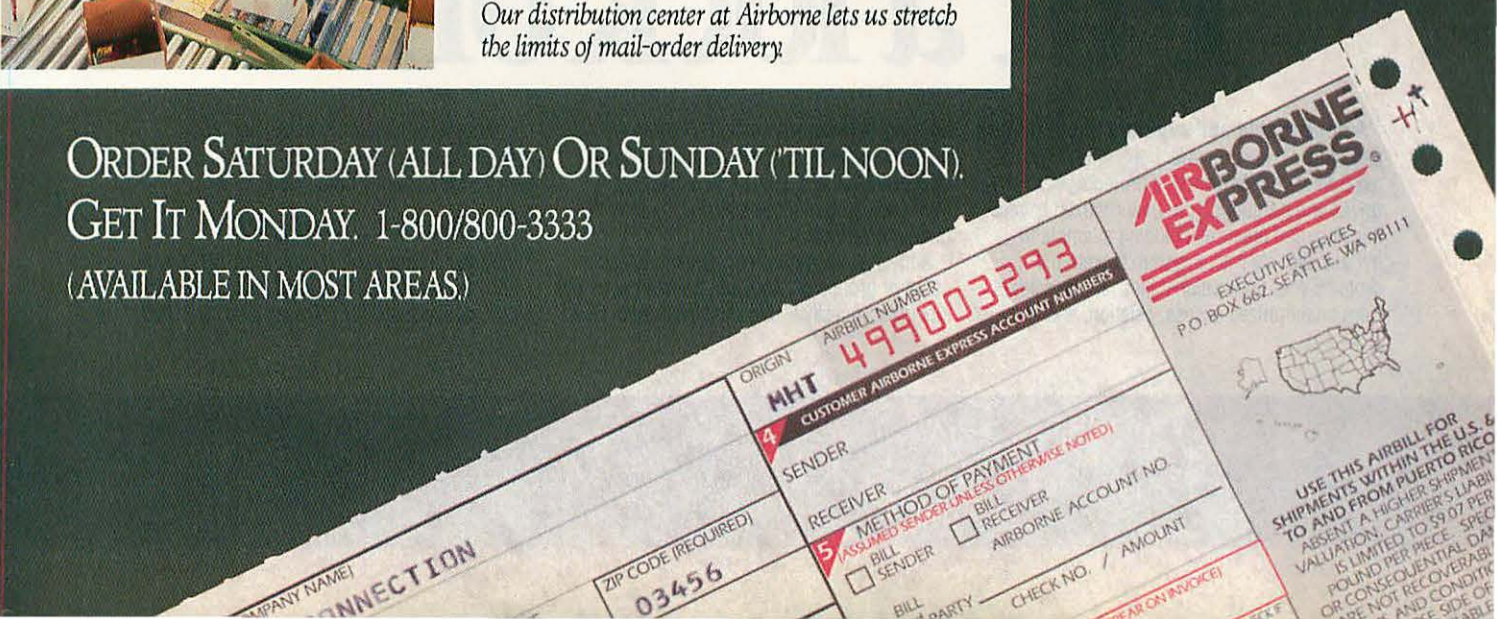
So move aside purple planes and brown trucks, Airborne's on a roll.

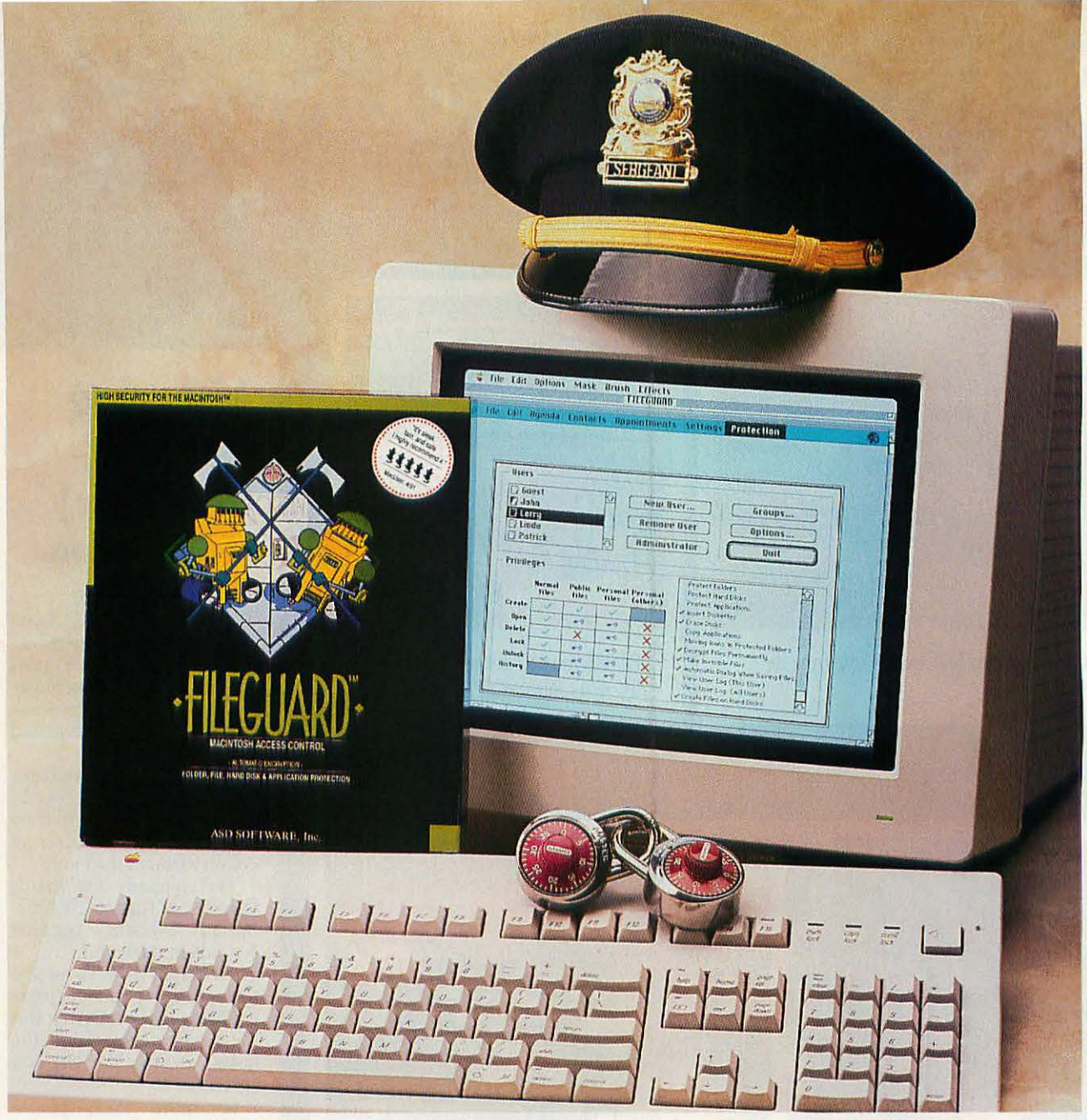




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"A dependable and superbly implemented program." So wrote *MacUser* (4/91) in awarding 5-Mice to **FileGuard**. It protects your hard drives and partitions from unauthorized access, copying, and erasure (including attempts to bypass security with a system diskette). It protects your applications, files, and all folders from unauthorized access, deletion, and/or copying—the newest version gives you complete control over who can use which application. And it protects your desktop (including system folder) from alterations by unauthorized users.

Access privileges can be given to specific users or groups of users and transferred to any other Mac in a single step. And the System Users Log lets you continuously track user/group activity. So put a lock on it with FileGuard. Now completely System 7 compatible.

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7085 ❼FileGuard 2.7 *(1 user) (Dec. '91)* **$139.**
7422 ❼FileGuard 2.7 *(5 user) (Dec. '91)* **489.**
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Dove Computer

6758 ❼DoveFax Desktop 2.0 **$289.**
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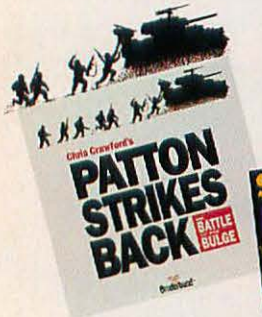
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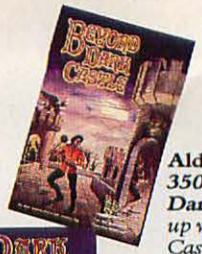
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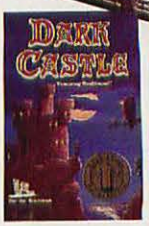
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3562 ❼ Patton Strikes Back. *Be Gen. Patton or van Monteaufel in this "Battle of the Bulge" simulation . .* **$35.**



Broderbund
3559 ❼ SimAnt. *You're in charge of an ant colony out to conquer a suburban backyard & overcome insect & human obstacles* **$35.**



Aldus
3502 ❼ Beyond Dark Castle. *Picks up where Dark Castle left off. Black Knight is back, but he's even harder to reach.* **$34.**



Aldus
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Casady & Greene
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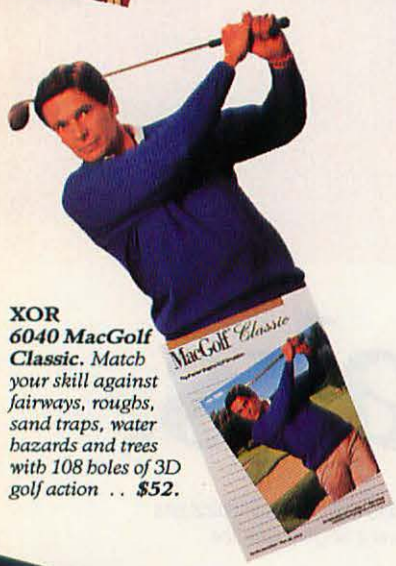


Postcraft Int'l.
6466 Citadel 1.21. *An incredible role-playing challenge. Your quest is to free the Lady Synd. Great graphics and sound!* **$26.**



Softstream
3501 The Classic Trilogy. *Play with Sir John & other historical gamesters. Practice or teach Cribbage, Whist & Hearts.* **$50.**

Softstream
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XOR
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Sir-Tech Software
8229 ❼ Bane of the Cosmic Forge. *Fantasy role-playing simulation in the tradition of Wizardry with authentic medieval period features . . .* **$35.**

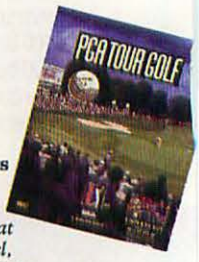
Electronic Arts
2962 ❼ Harpoon Challenger Pak. *Scenario Editor, Battleset #2, Harpoon Battlebook, and Harpoon itself* **$59.**



Advanced Gravis
9963 ❼ MouseStick. *Advanced optical joystick for all popular games. New feature: dual MouseStick control for MS Flight Simulator . . .* **$59.**



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Games



Sierra On-line
2523 King's Quest V. *Embark with King Graham on his most thrilling and perilous adventure—the quest for the missing Royal Family of Daventry. .* ***$34.***



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Inline Design
3414 ❼ Mutant Beach. *Take your Mac to Mutant Beach! The fully-animated, full-color interactive action adventure that's state of the art* ***$44.***





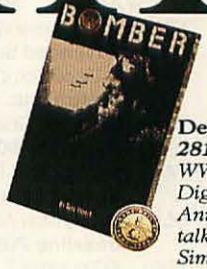
Inline Design
1944 ❼ Swamp Gas. *A charmingly wacky geography game for all ages, with arcade-style rewards for good performance .* ***$31.***



Inline Design
8809 ❼ Tesserae. *Stunningly beautiful Tesserae, a refreshing, exasperating full-color puzzle that's both beautiful and addictive* ***$31.***



Interplay Prod.
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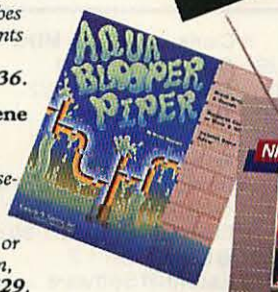
XOR
8061 ❼ MacSki. *Design your own ski slopes or use pre-designed courses. Offers multiple difficulty levels and conditions. . .* ***$39.***



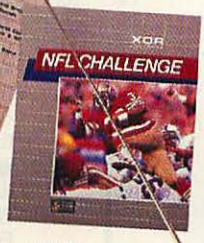


Toyogo
7836 ❼ Nemesis Go Junior 5.0. *An ideal intro to the board game of Go. Commented beg. games and visual tutorial aids .* ***$19.***

Toyogo
7624 ❼ Nemesis Go Master 5.0. *A richly-featured Go game which teaches basic & finer points of play. Visual tutorial aids .* ***$36.***



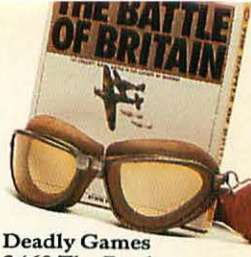
Casady & Greene
3343 ❼ Aqua Blooper Piper. *Don't let that basement flood! Fit weird pipe pieces together correctly, or else. Easy to learn, hard to master!* ***$29.***



XOR
3815 NFL Challenge 1.03. *Realistic football simulation including fumbles, interceptions, injuries, substitutions, and instant replays* ***$55.***



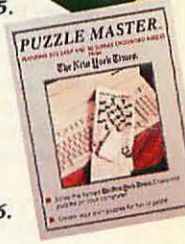
Accolade
1423 HardBall II. *Authentic graphics. Unparalleled realism. True-to-ballplayer animation . .* ***$31.***



Deadly Games
3460 The Battle of Britain II. *The greatest air battle in the history of warfare. Defend England against Germany's Luftwaffe. . . .* ***$31.***



Centron
❼ Casino Master. *5 gambling simulations in one package! BlackJack, Craps, Roulette, Video Poker, Baccarat.*
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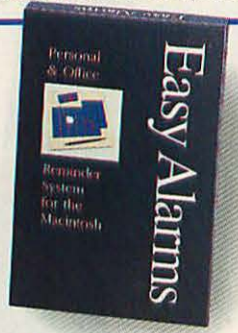
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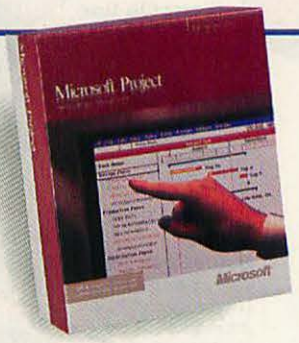
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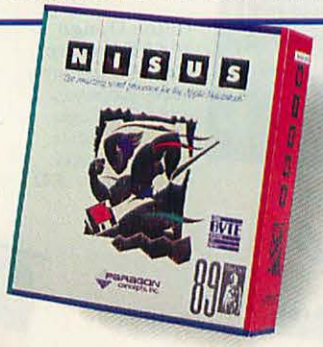
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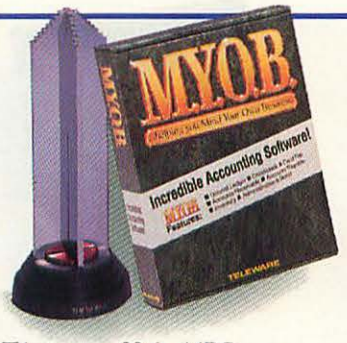
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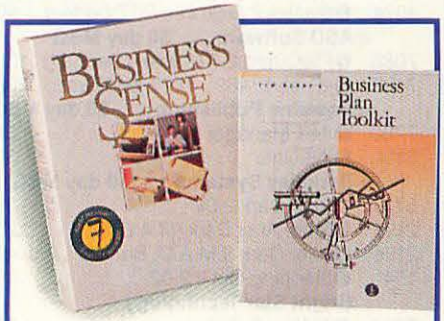
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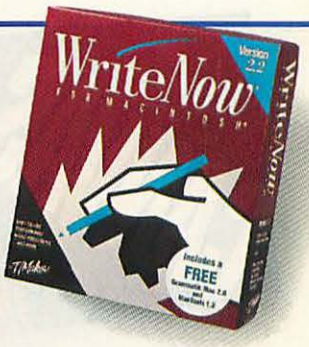


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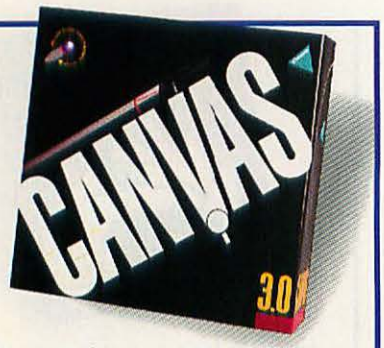
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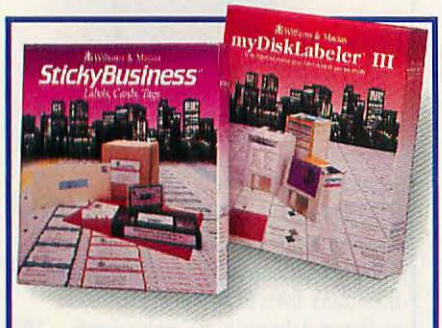
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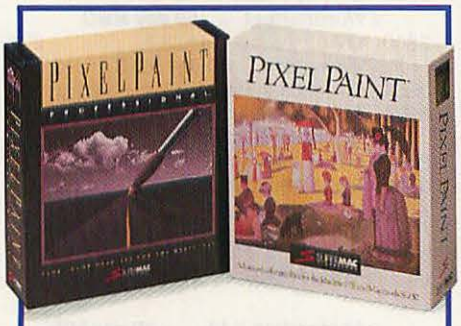
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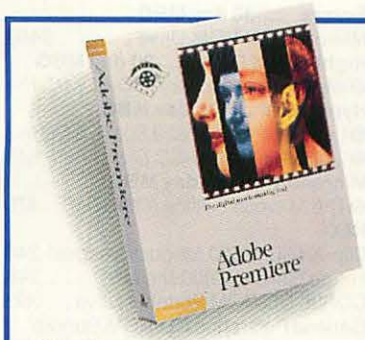
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5176 ❼Symantec AntiVirus for Mac *(SAM)* 66.
5724 ❼Symantec Utilities for Mac *(SUM II)* 96.
6748 ❼Norton Utilities for the Mac 1.1. .. 87.
3598 ❼Norton Utilities for Mac & SAM .. 118.
3865 ❼Norton Utilities Mac & GreatWorks 205.
3421 ❼THINK Pascal 4.0 165.
2688 ❼THINK C 5.0 199.
9957 ❼THINK Reference 1.0 69.
★Synex ... 30 day MBG
7147 ❼MacEnvelope 5.1 57.
★Tactic Software ... 30 day MBG
8964 ❼MasterFinder 1.2. 49.
★TGS Systems ... 60 day MBG
6667 ❼Prograph 2.5 *(Dec. '91)*. 309.
Visionary Software
3889 ❼Lifeguard 1.0.2 35.
3888 ❼Synchronicity 3.0 35.
3887 ❼First Things First 1.0.2 41.
★Wolfram Research ... 30 day MBG
8273 ❼Mathematica Enhanced 2.0 ... 789.



Adobe Systems
4145 ❼ *Adobe Premiere 1.0*–Easily combines video footage, audio recordings, animation, still images and graphics to create high-quality digital movies. Takes advantage of Apple's QuickTime media-integration technology $309.

CD-ROM

Adobe Systems
8794 ❼Adobe Type On Call CD/ATM. 47.
CD Technology
2321 CD-ROM Caddy. . 11. 2533 *(5)*. . 49.
8057 Porta Drive CD-ROM 599.
4140 Multimedia HANDisc 75.
★Cyan ... 30 day MBG
2717 ❼Cosmic Osmo 1.1 *(CD-ROM)* ... 37.
★Discovery Systems ... 60 day MBG
9967 ❼Nautilus *(subscription, CD-ROM)* 20.
9968 ❼Birds of North America *(CD-ROM)* 26.
9965 ❼Sherlock Holmes *(CD-ROM)* 26.
9966 ❼Shakespeare on Disc *(CD-ROM)* . 26.
1874 ❼Mammals N. America *(CD-ROM)* 52.



★TIMESLIPS ... 30 day MBG
2986 ❼ *Timeslips III 2.0H*–Fast, easy, accurate time and billing for service professionals. $194.
8939 *Accounting Link 1.0B*–Now links with general ledger accounting programs 52.

360C

MMC

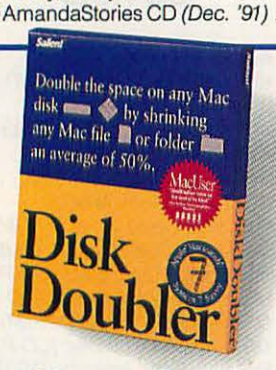
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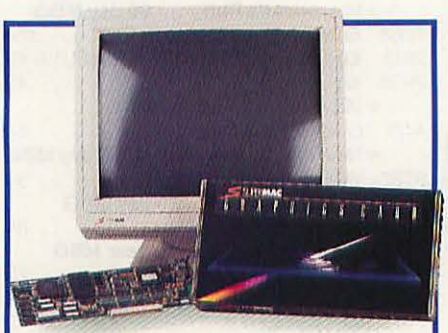
★**Everex ... 30 day MBG**
1875 Metro CD CD-ROM Drive $469.
★**Highlighted Data ... 30 day MBG**
7771 ❼Webster's Dictionary *(CD-ROM)*. 159.
★**HyperGlot ... 30 day MBG**
7473 ❼Learn French or 7829 Spanish CD 62.
2615 ❼Lingua ROM II *(3-CD Set)* 649.
★**Microsoft ... 30 day MBG**
6382 ❼The Microsoft Office *(CD-ROM)* 479.
NEC
6625 Clip-Art 3D *(2500 full-color images)* 246.
6636 Image Gallery *(2800 line art)* 246.
9441 CDR36 CD-ROM Portable Drive . . 399.
2595 General Reference CD-ROM Bundle *(includes CDR36, kit & 7 titles)* . . . 529.
★**Penton Overseas ... 30 day MBG**
2611 ❼Vocabulearn/ce 2.0 Spanish 1 CD 69.
2610 ❼Vocabulearn/ce 2.0 French 1 CD 69.
Pixar
3566 ❼Showplace/RenderMan CD *(Nov.)*. 449.
★**Tactic Software ... 30 day MBG**
2519 Tactic Multi-Media CD 149.
★**Voyager ... 30 day MBG**
3921 ❼Mozart Dissonant Quartet 39.
3917 ❼A Silly, Noisy House 39.
3919 ❼AmandaStories CD *(Dec. '91)* . . . 39.



★Salient Software ... 30 day MBG
7404 ❼ *DiskDoubler 3.7*–Because no disk is big enough, this latest System 7 Savvy version provides smaller compressed files, increased speed, simplified file backups, & self-expanding files. *Macworld* 1991 World Class Award winner. $49.

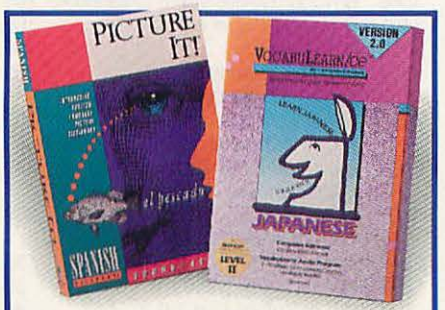
VIDEO & SOUND
MUSIC, MIDI, ANIMATION

★**Ars Nova ... 30 day MBG**
1215 ❼Practica Musica 2.2. 66.
★**Bogas Productions ... 60 day MBG**
6135 Super Studio Session w/Music Library 99.
Coda Music Systems
5604 ❼Finale 2.6.1. 549.
★**Farallon Computing ... 30 day MBG**
2199 MacRecorder Sound System 2.0.5 174.
Full Logic Studios
1163 ❼Mac-Sound *(241 great effects)*. . . 79.
★**MacroMind ... 30 day MBG**
9353 ❼MacroMind MediaMaker 1.0. . . 489.
6159 ❼MacroMind Accelerator 3.0. . . . 125.
5087 ❼MacroMind Director 3.0 699.
2246 ❼MacroMind Three-D 1.0 1029.
Mass Microsystems
2592 QuickImage 24. 289.



★SuperMac Tech. ... 60 day MBG
19" SuperMatch Monitor & Spectrum/8 Card–Spectrum/8 cards run accelerated color graphics on affordable 19" SuperMatch color display.
1805 *19" SuperMatch Color Display* $1999.
Spectrum/8 Cards for Nubus, LC, or IIsi . . ea. 559.

★**Paracomp ... 30 day MBG**
7839 ❼FilmMaker 2.0.1 435.
Passport Designs
8253 ❼TRAX 2.2 57.
3117 ❼Master Tracks PRO 4 4.5 315.
8250 ❼Encore 2.0 379.
3115 ❼MIDI Interface. 79.
PCTV
2244 System 7 Video w/Lon Poole *(VHS)* . . 9.
2245 System 7 Video w/Lon's Book. 25.
Pixar
1596 ❼ShowPlace/MacRenderMan Bndl. 649.
RasterOps
8526 Video Expander 499.
7457 Video ColorBoard 364 699.
3224 Expresso Slide Scanner 699.
9784 RasterOps 24SI 649.
8944 RasterOps 24STV 1249.
★**Sound Source ... 30 day MBG**
3547 ❼Star Trek: The Logical Collection . 29.
3607 ❼Star Trek: The Final Frontier. 29.
★**SuperMac Tech. ... 60 day MBG**
1813 Color Calibrator 499.
1844 Spectrum/8 Series III. 559.
1851 Spectrum/24 Series III. 2099.



★Penton Overseas ... 30 day MBG
❼ *PICTURE-IT!*–Presents a written translation and highly detailed picture along with a digitally edited audio pronunciation for a given word by a native speaker ea. $40.
❼ *VocabuLearn/ce Levels I, II, III* ea. 35.

1877 Spectrum/8LC or 2026 S/8si. . . . $559.
2330 Spectrum/8-24 PDQ or 2231 PDQsi 999.
4122 Video Spigot LC or 4114 VS IIsi *ea.* 349.
★**Symmetry ... 30 day MBG**
8172 ❼Mariah 1.0 93.
★**Voyager ... 30 day MBG**
9322 ❼Voyager Videostack 2.2. 65.
9328 ❼Voyager CD Audiostack. 65.
9326 ❼Beethoven or 9327 ❼Stravinsky. . 65.
3316 ❼Exotic Japan 1.0 *(CD-ROM)* 65.

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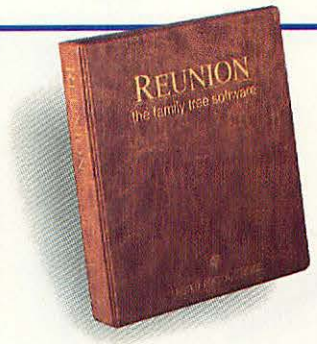
Accolade
1423 Hard Ball II 31.
8220 ❼Jack Nicklaus Golf 34.
★**Aldus ... 30 day MBG**
3503 ❼Dark Castle. 34.
3502 ❼Beyond Dark Castle 34.
★**Baseline Publishing ... 30 day MBG**
7785 ❼Talking Moose 3.1. 23.
★**Beacon Technology ... 30 day MBG**
❼HyperBible 2.04 *(KJ or NI)* . *ea.* 125.



★Sound Source ... 30 day MBG
3547 ❼ *Star Trek: The Logical Collection*–Exciting new Star Trek sounds. Incl. everyone's favorite dialog, sound effects and music cues. $29.
3607 ❼ *Star Trek: The Final Frontier*–Features sounds for the hard-core Trekkie. 29.

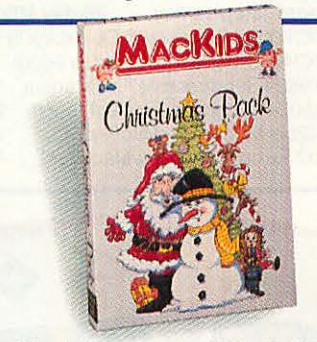
Broderbund Software
4314 ❼Type! 1.0 18.
6516 The Playroom *(CP) (color, Oct. '91)* . 29.
❼Carmen Sandiego Series *(CP)* *ea.* 29.
6384 ❼PlayMaker Football *(color, Oct. '91)* 29.
9804 ❼RoboSport or 8195❼BannerMania 35.
3559 ❼SimAnt or 3562❼Patton Strikes Back35.
8266 ❼SimEarth 1.0 40.
4966 SimCity *(CP)* 29. 5871 ❼Supreme 47.
★**Carina Software ... 30 day MBG**
5726 ❼Voyager 1.2. 87.
★**Casady & Greene ... 60 day MBG**
4119 ❼Crystal Quest w/Critter Editor 2.2x 29.
7495 ❼Mission Starlight or 7498❼Sky Shad. 29.
3343 ❼Aqua Bloop. Piper or 3342❼Glider 29.
★**Centron Software ... 30 day MBG**
2707 ❼Puzzle Master 26.
8525 ❼Casino Master *(B&W)*41. 8524 *(Color)*45.
★**Davidson & Assoc. ... 30 day MBG**
3922 ❼Talking Spell It Plus 29.
6128 ❼MathBlaster Mystery 1.0 29.
2574 ❼MathBlaster Plus, 8278 ❼Alge-Blaster Plus or 3923 ❼Personal Training SAT 35.

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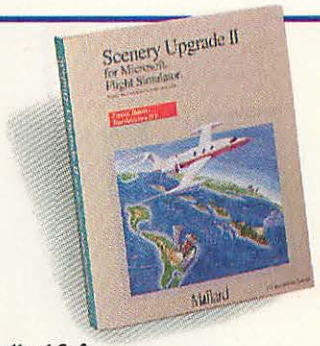
★**Leister Productions ... 30 day MBG**
7126 ❼ *Reunion 3.0*–The family tree software only for the Mac. Quickly record your family information and images. Create charts and documents worthy of publication. Rated 4½ Mice by *MacUser* **$115.**

★**Deadly Games ... 30 day MBG**
2811 ❼Bomber. 31.
3460 ❼Battle of Britain II *(Dec. '91)* 31.
EARTHQUEST
3118 ❼EARTHQUEST Ecology 1.0. 34.
8050 ❼EARTHQUEST 2.0 39.
Electronic Arts
1303 ❼Loom 1.0 29.
8194 Armor Alley 1.0. 32.
8643 ❼Harpoon or 1907 ❼PGA Golf *ea.* 39.
2962 ❼Harpoon Challenger Pak. 59.
3385 ❼Secret of the Silver Blades 39.
FTL/Software Heaven
1555 OIDS 1.0 25.
★**Great Wave ... 30 day MBG**
4334 ❼NumberMaze 26. 8527 ❼*(Color)* 36.
8044 ❼NM Decimals & Fractions *(Color)*. 36.
1517 ❼ReadingMaze 26. 1513 ❼*(Color)* 36.



★**Nordic Software ... 30 day MBG**
4087 ❼ *Christmas Pack 1.0*–Over 15 games, puzzles, and other activities charged with Christmas cheer. Holiday sounds and color graphics throughout. Great fun for the whole family **$30.**

★**HyperGlot Software ... 30 day MBG**
❼Word Torture 4.0-Beginner to Advanced *(Span., Fren., Germ., Ital. & Rus.)* *ea.* $35.
❼Pronunciation Tutor - Beginner *(Span., Fren.)* *ea.* 35. *(Germ., Chin.)* 39.
❼Verb Tutor - Intermediate *(Spanish, French, German)* . . . *ea.* 39.
★**Inline Design ... 30 day MBG**
1562 ❼3 in Three or 1944 ❼Swamp Gas 31.
8809 ❼Tesserae *(addictive puzzle)* 31.
7622 ❼Darwin's Dilemma 2.0 *(Dec. '91)* . 31.
3414 ❼Mutant Beach *(Nov. '91)* 44.
Interplay Productions
1894 ❼BattleChess *(3D animation)* 29.
3520 ❼Dvorak on Typing *(Dec. '91)* 29.
1893 ❼CheckMate *(infinite play levels)* . . 31.
★**Learning Company ... 30 day MBG**
2670 ❼Reader Rabbit 3.0 *(CP) (ages 4-7)* 34.
3272 ❼Outnumbered 1.0 34.
3281 ❼The Writing Center 1.0. 51.
★**Leister Productions ... 30 day MBG**
7126 ❼Reunion 3.0 *(Dec. '91)* 115.
★**MECC ... 30 day MBG**
3963 ❼Oregon Trail 1.0. 28.
3960 ❼Number Munchers 1.2 28.
3959 ❼Word Munchers 1.2. 28.
4095 ❼Super Munchers 1.0 28.
Mallard Software
Scenery Disks 1-4 Flight Simulator *ea.* 30.
★**Microsoft ... 30 day MBG**
2868 ❼Flight Simulator 4.0 *(CP)* 43.
★**Mysterium Tremendum ... 30 day MBG**
5841 ❼Moriarty's Revenge 1.03 32.
★**Nordic Software ... 30 day MBG**
8257 ❼PreSchool Pack - Color 1.0 35.
2716 ❼Word Search Deluxe 1.0 35.
4087 ❼Christmas Pack 1.0. 30.
★**Penton Overseas ... 30 day MBG**
❼VocabuLearn/ce Levels I & II *(French, Italian, Spanish, German, Russian, Hebrew, & Japanese).* *ea.* 35.
❼PICTURE-IT! *(French, Italian, Spanish and German))* *ea.* 40.
★**Personal Training Sys. ... 60 day MBG**
❼Over 60 learning levels from beginner to advanced for System 7, QuarkXPress, Persuasion, FileMaker II/Pro, PageMaker, Illustrator, FreeHand, Word, HyperCard, Excel, & the Mac *ea.* 50.
Postcraft International
6466 ❼Citadel 1.21. 26.
Sierra On-Line
Space Quest III or IV *ea.* 34.
2523 King's Quest V *(Nov. '91)*. 34.
Sir-Tech Software
8229 ❼Bane of Cosmic Forge *(w/hints)*. . 35.
★**Softstream ... 30 day MBG**
3501 Classic Trilogy *(cribbage, etc.) (Dec.)* 50.
3472 Family Card Games *(Dec. '91)* 50.
Software Toolworks
4619 ❼Mavis Beacon Typing 1.3 *(CP)*. . . 32.
1908 ❼World Atlas 1.0 52.
★**Spectrum Holobyte ... 30 day MBG**
3464 ❼Tetris 1.3 or 6112 ❼Welltris 1.1 *ea.* 22.



Mallard Software
❼ *Scenery Upgrades-Microsoft Flight Simulator 4.0*–Adds detailed high-quality scenery & graphics to Microsoft's latest version of Flight Simulator. Areas covered include the East Coast, Midwest, Japan, Europe & Hawaii **ea. $30.**

3017 ❼Wordtris 1.0 or 8180 ❼Faces 1.0 *ea.* 25.
3459 ❼Falcon 2.2.1 or 8181 ❼Vette 1.0 *ea.* 33.
★**Spinnaker ... 30 day MBG**
2328 Sargon IV 1.03 *(CP) (chess)* 28.
★**Strategic Studies ... 30 day MBG**
3287 ❼Warlords *(empires at war)* 31.
StudyWare
❼ACT, GMAT, GRE, or SAT Prep *ea.* 29.
8098 ❼LSAT Prep for the Mac 3.7. 35.
Terrace Software
8192 ❼Mum's The Word 1.1A *(gardening)* 79.
★**Toyogo ... 30 day MBG**
7836 ❼Nemesis Go Junior 5.0 19.
7624 ❼Nemesis Go Master 5.0. 35.
2471 ❼Nemesis Deluxe Toolkit 5.0 69.
★**XOR ... 30 day MBG**
8061 ❼MacSki 39. 6040 MacGolf Classic 52.
3815 NFL Challenge 1.03 55.



★**Berkeley Systems ... 30 day MBG**
2198 ❼ *More After Dark (M.A.D.)*–25 new displays for After Dark. Featuring Mowin' Man, Tunnel, Crazy Kittens, Art Museum **$23.**
5737 ❼ *After Dark 2.0V*–Stops screen burn-in **28.**
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8059 ❼ *MacInTax Personal Ed. 1991*–America's best selling tax software for the Mac. *MacUser*'s Editors' Choice Award (2/89), & winner of the 1990 Macworld World Class Award $59.
MacInTax Personal States 1991 ea. 42.

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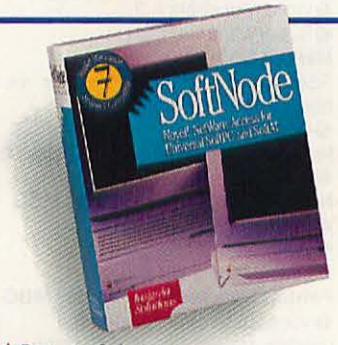
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4169 ❼Outbound Notebook 2030/440 *(68ec030, 4 MB, 1.4 Floppy, 40 HD)* 3399.
4170 ❼Outbound Notebook 2030/441 *(same as 2030/440, incl. math copro)* 3449.
4172 ❼Outbound Notebook 2030/460 *(68ec030, 4 MB, 1.4 Floppy, 60 HD)* 3699.
4174 ❼Outbound Notebook 2030/461 *(same as 2030/460, incl. math copro)* 3749.

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★**Abaton ... 30 day MBG**
6266 InterFax 24/96 Modem 299.
2724 InterFax 24/96 w/InterShare 349.
★**Applied Engineering ... 30 day MBG**
8362 ❼QuadraLink *(w/AE Shadow)* 205.
★**Argosy Software ... 30 day MBG**
7872 ❼Software Bridge/Mac 2.0.1 99.
2448 ❼RunPC/Network 279.
★**CE Software ... 60 day MBG**
8066 ❼QuickMail 2.5 *(5)* 249. 8067 *(10)* 375.
★**CompuServe ... 60 day MBG**
1676 ❼Macintosh Membership Kit 1.5 .. 25.
1673 ❼CompuServe Navigator 3.04 49.
1674 ❼Membership Kit/Navigator Bundle 72.
★**DataViz ... 60 day MBG**
1823 ❼MacLink Plus/PC 6.0 *(Nov. '91)* . 129.
4842 ❼MacLink Plus/Translators 6.0 *(Nov.)* 109.
★**Dayna ... 60 day MBG**
DaynaPORT E: *(10BASE-T)* ea. 209.
DaynaPORT E: SE, SE/30, II, IIsi, LC 229.
8719 EtherPrint or 9888 *(10BASE-T)* ea. 349.
Dove Computer
6758 ❼DoveFax 2.0 289. 3352 NuBus $329.
9634 ❼DoveFax Plus 349. 4111 NuBus 399.
4110 ❼DoveFax LAN 499. 4109 NuBus 529.
★**Farallon Computing ... 30 day MBG**
Full line available. Partial listing.
9805 ❼Timbuktu 4.0.2 135.
4866 ❼Timbuktu/Remote 3.0 135.
9961 PhoneNET Card PC 209.
6273 PhoneNET StarConnector 10-Pack. 129.
4869 PhoneNET Connector 10-Pk *(DIN8)* 198.
2206 PhoneNET StarController 300 899.
★**Freesoft ... 60 day MBG**
6115 ❼White Knight 11 85.
★**Global Village ... 30 day MBG**
8946 ❼TelePort A300 139.
8945 ❼TelePort/FAX 185.
Hayes
2300 ❼Smartcom II 3.3. 84.
8614 Personal Modem 2400 Plus 149.
7391 ULTRA 96 Modem 669.
Insignia Solutions
7557 ❼Access PC 1.1. 60.
9726 ❼Entry Level SoftPC 2.5. 125.
4089 ❼Universal SoftPC 2.5 195.



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3441 ❼ *SoftNode 1.0*–Add SoftNode to SoftPC, and your Mac can not only run MS-DOS applications, it can also share programs over a Novel PC Network! Your next PC could be a Macintosh $105.

3229 ❼SoftAT 2.5 299.
3441 ❼SoftNode 1.0 105. 3454 *(10 Pak)* 699.
Intel Corporation
5119 2400EX Modem 169. 6420 (MNP) 225.
★**Microcom ... 30 day MBG**
7459 ❼CarbonCopy Mac 2.0 *(single)* ... 59.
1556 ❼CarbonCopy Mac 2.0 *(unlimited)* 179.
★**Nuvotech ... 60 day MBG**
3000 TurboNet ST *(DIN8)* 29. 6751 *(12 Pak)* 279.
★**Orange Micro ... 30 day MBG**
2392 Orange386 *(20 MHz)* 1799.
★**Practical Peripherals ... 30 day MBG**
8994 2400 V.42 bis Modem 199.
7934 PM9600SA Modem 1.26 469.
9849 SmartPack 9600 *(w/Smartcom II)* . 529.
★**Prometheus ... 30 day MBG**
2590 ProModem 2400 Mini Plus 129.
3832 ProModem Remote Plus. 249.
3232 ProModem 24/96 S/R Minifax Plus 269.
8990 ProModem Ultima 689.
3831 ProModem 9600M-EC 499.
PSI Integration, Inc.
3143 COMstation 1 285. 3142 COM 2 379.



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9634 ❼ *DoveFax Plus 2.0*–Now System 7 compatible! Combines 3 popular office machines into one small package. 2400 bps modem/9600 bps send/receive fax will also answer your phone and allow users to leave voice mail..... $349.

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3444 ❼NetSerial. 275.
4347 NetBridge or 4942 ❼TeleBridge.. 409.
Sitka/TOPS
4188 Teleconnector *(DIN8)* 23. 2230 *(10)* 189.
6264 ❼TOPS Network 3.1. 187.
★**Software Ventures ... 30 day MBG**
3455 ❼MicroPhone II 3.0 *(free upgrd. 4.0)* 215.
★**Synergy ... 30 day MBG**
6618 ❼VersaTerm 4.5 90. 6619 PRO 3.5.1 177.
★**Tactic Software ... 30 day MBG**
2996 ❼Traffic Controller Personal 1.0 ... 65.
★**Technology Works ... 30 day MBG**
1582 ❼GraceLAN 295. 1584 Corporate 719.
1583 ❼GraceLAN 50 Node Upgrade .. 119.
★**White Pine Software ... 30 day MBG**
3539 ❼Mac 220 . 89. 3535 Mac 240 . 139.
3541 ❼Mac 241 or 3544 Exodus .. *ea.* 199.
★**Zoom Telephonics ... 30 day MBG**
1168 MX2400R Modem *(w/❼QuickLink II)* 69.
1176 MX2400S Modem *(w/SendFax 9600)* 79.
2310 FX9624 Send/receive Fax/Modem 119.
3576 FX9624V Send/receive Fax/Modem 169.
1179 V.42bis Modem *(w/MacPack)* 139.
2311 V.32 Turbo Modem *(w/MacPack)*.. 419.



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3865 ❼ *GreatWorks with Norton Utilities*–Buy GreatWorks, a powerful new integrated program combining 8 applications in one easy-to-use package, and get a free copy of Norton Utilities for the Mac. Offer ends 12/31/91 $205.

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8335 PLI TurboFloppy 1.4..... 309.
8327 PLI Infinity 40 Turbo..... 699.
9752 PLI Infinity 88 Turbo..... 849.
2644 Quantum 52 MB External..... 489.
8330 PLI 105 MB . 649. 8329 200 MB . 989.
2327 PLI 2GB DAT Drive..... 2059.
2325 PLI Infinity Optical Drive..... 3199.
1866 Quick SCSI Card..... 319.

PSI Integration, Inc.

3135 PSI MultiColor..... 99.
3137 Crunch-It! LC..... 113.
3141 Cache-It!..... 189.

Sigma Designs

1501 DoubleUp with ❼DiskDoubler 3.7 179.

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7817 16 MHz Mercury 030 *(for Mac SE)* 359.
7816 20 MHz Gemini 030..... 799.
68882 Math Coprocessors..... call

STORAGE MEDIA

★**3M ... 60 day MBG**

3943 DC2000 40 MB Data Cartridge.... 18.



IOMEGA

2224 90 MB Transportable Drive–Rugged and built to last, this drive will absorb 1000 g's of shock and provide 90 MB of portable storage. Awards from *MacUser*, *Macworld*, *Byte*, and *InfoWorld*. (reqs. kit)..... $799.

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2214 3½" DS Disks *(10)* 9. 2242 *(50)* 39.
2215 3½" HD Disks *(10)* $15. 2241 *(50)* $69.
2243 3½" Color *(10)* DS . 10. 2239 HD . 18.

★**Sony ... 60 day MBG**

3297 3½" DS Disks *(10)* 9. 6148 *(30)* 25.
3298 3½" HD Disks *(10)* 16. 6375 *(30)* 45.
1603 DG60M... 16. 2520 DG90M... 27.

★**SyQuest ... 60 day MBG**

6592 44 MB Cartridge 72. 9728 *(10)* 689.

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Apple Computer

7748 Personal LaserWriter Toner Cart.... 89.
1115 LaserWriter II Toner Cartridge 105.

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CoStar

6091 The Organizer..... 189.
7453 The Organizer Jr. 82.

★**Curtis Manufacturing ... 30 day MBG**

8046 MVP Mouse *(MVP-1)*..... 89.

★**Goldstein & Blair ... 30 day MBG**

8374 ❼The Macintosh Bible *(with disks)* . 25.

IDG Books

2238 Macworld Guide to System 7 Book . 19.

★**I/O Design ... 30 day MBG**

8812 Ultimate Classic Carrying Case.... 64.
3371 Ultimate PowerBook Carrying Case 79.
1941 Ultimate LC Carrying Case..... 95.

★**Kensington ... 30 day MBG**

Full line available. Partial listing.

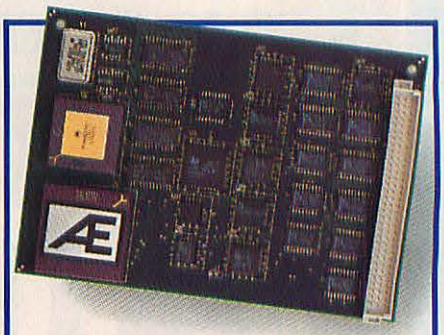
4973 Power Tree 20..... 27.
2559 Apple Security Kit..... 33.
9303 Keyboard Shelf..... 39.
6763 SE Radiation/Anti-Glare Filter 52.
5064 Apple Color Monitor Polarizing Filter 63.

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1505 Oak Disk Case *(36)* 21. 4623 *(90)* 32.

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4146 TransWarp LC..... $829.
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CoStar Corp.
1884 ❼LabelWriter II 193.
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★Datadesk ... 30 day MBG
9830 ❼MAC101E 129. 2384 w/QuicKeys 149.
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3832 *ProModem Remote Plus*–Pocket-sized, battery operated 2400 bps data/9600 bps send/receive fax modem for easy, on-the-road faxing. Supports MNP 5/V.42 protocols; includes MAcKNOWLEDGE & Maxfax 3.0 . . . $249.

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1144 ❼Silhouette Trackball 1.0 82.

GDT Softworks
3429 ❼BetterWriters 1.0 *(software drivers)* 39.
6256 ❼PrintLink Collection/Serial 4.0.1. . 59.
6151 ❼JetLink Express/Serial 2.1. 89.

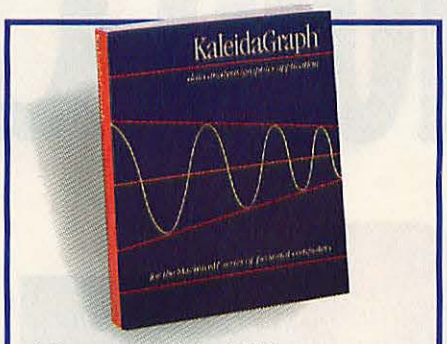
Hewlett-Packard
6514 HP DeskWriter *(incl. cartridge)* . . . 479.
2964 HP DeskWriter *(color, incl. cart.)*. . . 849.
9993 HP LaserJet IIIP *(w/toner, reqs. kit)* 1149.
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❼Turbo Mouse 3.0 *(Plus or ADB)* . 107.

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3036 ❼Grappler 2.0 . 92. 6229 ❼LX . 111.

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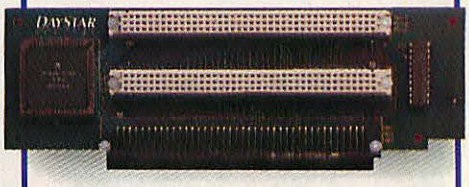
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Computer Care
BookView Imperial call
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★DayStar Digital ... 30 day MBG
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8556 ❼FastCache for Mac IIci. 265.
3401 ❼FastCache IIsi 299. 3389 w/FPU 369.
40 MHz PowerCache
for SE/30, II, IIx, IIcx, IIci, IIsi, LC . . 899.
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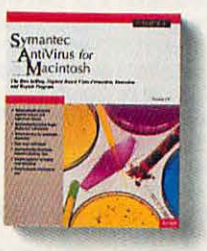
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Circle 96 on reader service card

ART BEAT

by Cathy Abes

The tools and the talent behind Macworld's graphics and the techniques that make them possible



The illustration that opens our "All about Color" feature on page 140.

Artist: "Rather than ask what the Mac can do for me, I try to think of what I can do for the Mac," says illustrator Erik Adigard, who with his partner, Patricia McShane, runs San Francisco–based M.A.D. studio. "I want to stretch the tools, push them to their limits, break the rules."

Tools: Mac IIfx with 16MB of RAM; 160MB hard drive; Microtek MSF-300ZS color scanner; SyQuest 45MB removable-cartridge drive; Adobe Photoshop 2.0; Adobe Illustrator 3.0; Ray Dream Designer.

How It Was Done: Adigard used a simple but unusual technique for the illustration that opens our "All about Color" feature: rather than scanning photos, he directly scanned several objects and manipulated the scanned images in Photoshop. The most dramatically altered object started out as a simple bicycle reflector and ended up as the richly textured background behind the gloved hand. The original scanned image appeared as an object with red highlights and a black background. Adigard cropped the areas he did not want and then stretched the top part of the object to the shape and size he wanted. He then boosted the contrast, so it would be easier to select the black or the red areas. With the black areas selected, he used the Feather command to blur the selection and then created a gradation from green to blue. Next, with the Magic Wand he selected the red lines at the bottom of the image, feathered that selection, and gradated it from red to yellow.

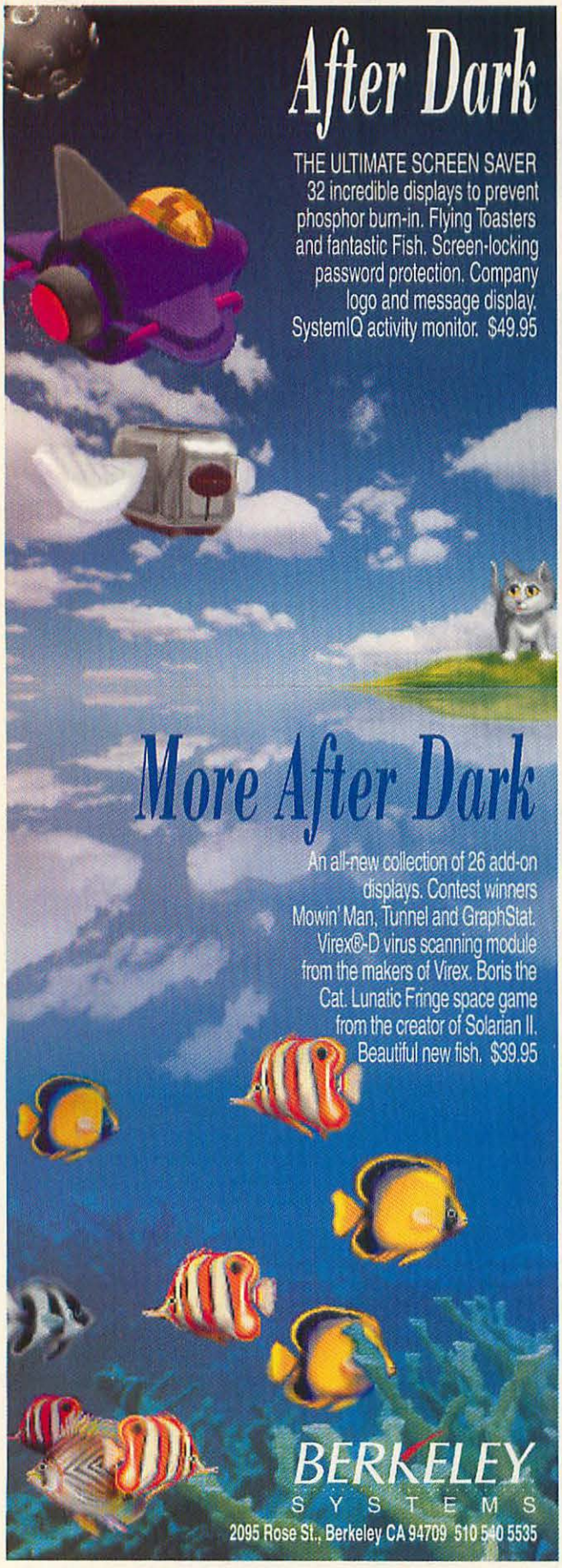
To create the pattern of dots that would be superimposed on the bicycle reflector image, Adigard used Illustrator, starting with one black circle and duplicating it numerous times to make an equally spaced line of circles. He duplicated the line and offset the duplicate, repeating the process until he had a dot pattern approximately the size and shape of the background. After importing the dot pattern into Photoshop, he resampled the image to adjust its size to match that of the original background. Then he inverted the image to change it from black dots on a white background to white dots on a black background and chose Gaussian Blur (under the Filter submenu) with a 5-pixel radius. After selecting Darken Only at 100 percent, he pasted the dot pattern on top of the background, so that the dark areas of the dot pattern remained intact while the original background showed through the dots.

The gloved hand with the colored balls was photographed with a Polaroid camera and the photo was scanned, but Adigard used this scan merely as an outline. To capture the texture of the glove fabric, which did not come through in the original scan, Adigard rescanned the center part of the glove itself and enlarged the scanned image so it would cover the entire hand. Because only the inside of the hand was selected when he pasted the texture scan, the hand functioned as a mask, keeping the glove texture from extending beyond the hand's boundaries. After creating highlights on the hand and the balls using Photoshop's Fill, Feather, Color Balance, Brightness/Contrast, and Hue/Saturation, he imported the hand into the background.

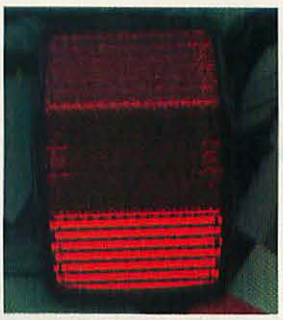
To create a glowing, ghostlike hand that seems to pulsate with energy, Adigard feathered selected parts of the hand at 25 pixels, and selected Invert. To simulate transparency, he copied small pieces of the background and pasted them over parts of the hand at 55 percent opacity. The hand actually shows through the pieces of background, but it looks like you're seeing through the hand.

The green background that edges the entire illustration and the pale background underneath the four keys are from the same scanned object: a sheet of

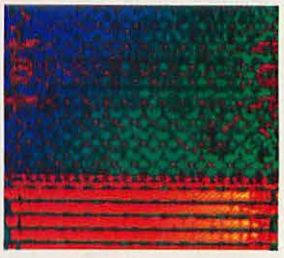
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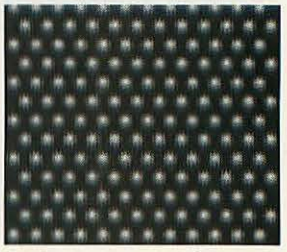
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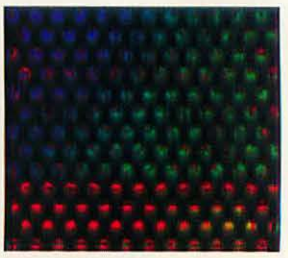
The scanned bicycle reflector.



The image after it was resized, feathered, and colorized.



The dot pattern resampled, inverted, and blurred in Photoshop.



The dot pattern pasted over the scanned image.



The scan of the gloved hand photo.



The scan of the glove itself.

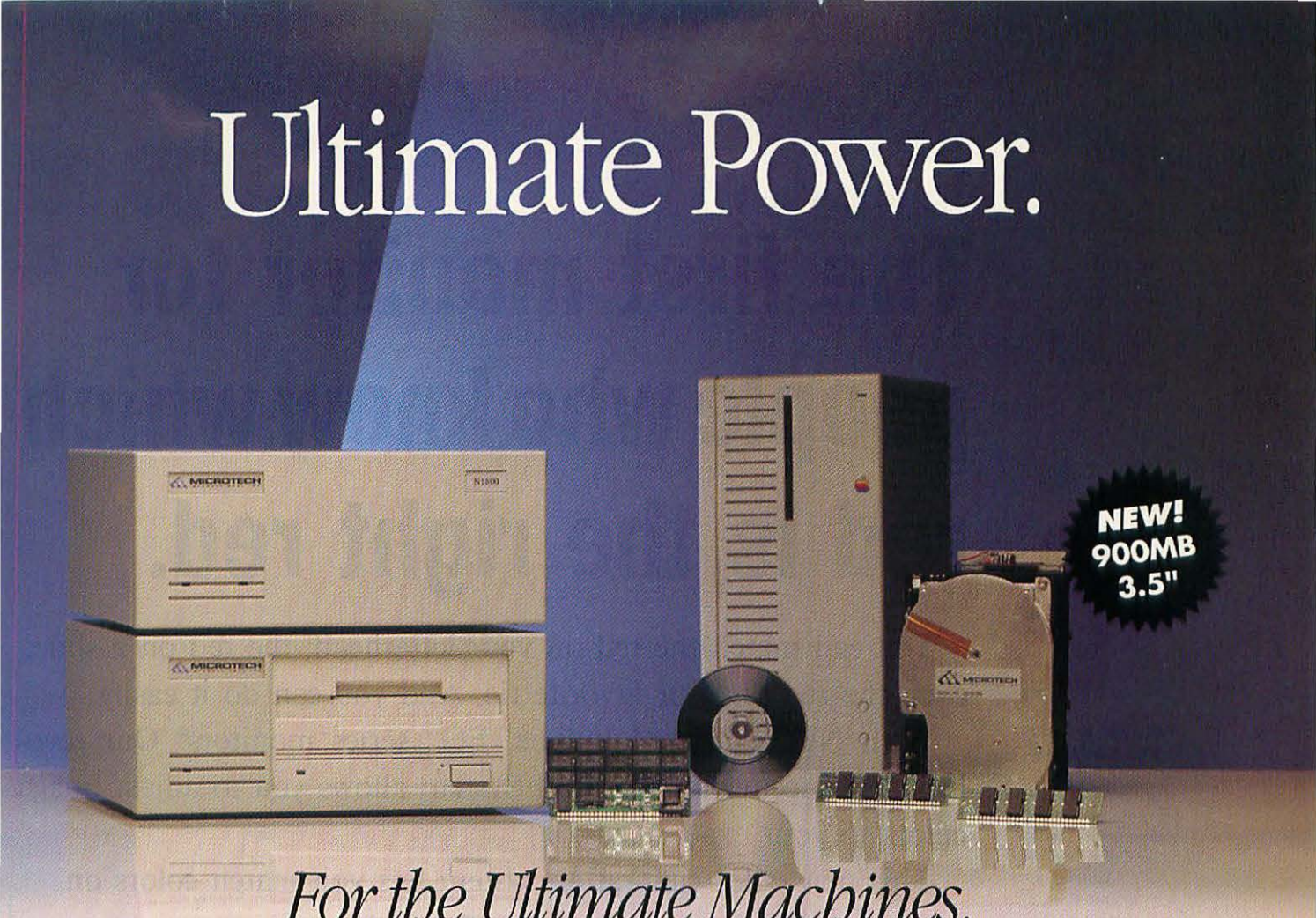


The final hand image placed on the background.

iridescent laser-etched paper, that heavy plastic-coated stock with a holographic effect that some unconventional business cards are printed on. The keys were simple 3-D extrusions created in Ray Dream Designer (the letters on the keys, as well as the word *Pantone* on the background, were typed in Photoshop). He lightened the background with Brightness/Contrast, then used the Blur filter to diffuse *Pantone,* selected Darken Only, and pasted the letters onto the pale background at 20 percent opacity. After placing the *Pantone* background in Ray Dream Designer, on a base he'd created for the background and the keys, he created four separate lights and set each one's color, density, angle, and distance to create different colors and drop shadows for each key and its surrounding background.

Finally, Adigard combined the three main images he had created—the ghostly hand, the keys on the pale background, and the green background—in Photoshop. M

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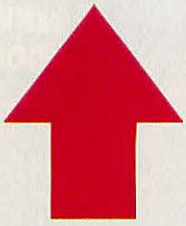
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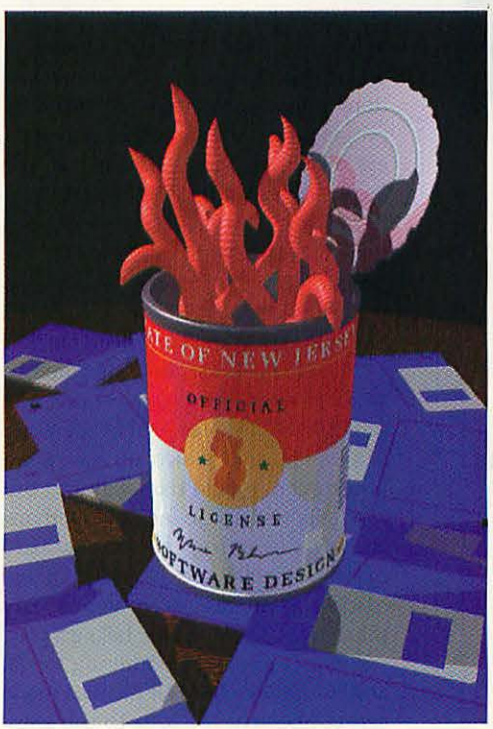
EXCUSE ME, SIR, BUT DO YOU HAVE A LICENSE FOR THAT HYPERCARD STACK?

BY STEVEN LEVY

Recently I came across a striking factoid: the New Jersey Legislature annually considers approximately *10,000* bills and resolutions. When normally confronted with such an oddity, I spend a moment or so in slack-jawed wonderment, as if considering an image in a David Lynch film, and quickly return to my everyday business. But since this 5-digit number was offered to me in the course of tracking the fate of New Jersey Assembly Bill 4414, I stocked it away. Somehow it shed light.

I must explain. New Jersey Assembly Bill 4414 is sponsored by Barbara Kalik, a 14-year veteran Democratic assemblywoman representing an area south of Trenton. This piece of legislative action apparently zipped through the assembly without much notice, and at press time rests in a Senate committee, awaiting further action. Now, however, people have noticed it. Because, if enacted into law, Bill 4414 would make New Jersey the first state in America to license computer programmers. Or, as the bill puts it, in rather sexist language if I may say so, "No person shall practice, or present himself as able to practice, software designing unless he possesses a valid license as a software designer in accordance with the provisions of this act."

One of Kalik's aides allows that the bill is "vague" on implementation. But after carefully deconstructing the bill, I offer this translation: If Bill 4414 passes, anyone who wishes to design software for profit in the state of New Jersey must submit to a test approved by something called the State Board of Software Designers, an aggregation of nine commissioners appointed by the governor. This would probably consist of six people who presumably know a byte from a subroutine and who would promise to take the test themselves within 18 months; a member of the executive branch; and two representatives from the public sector. The test itself would gauge an applicant's knowledge of "software designing theory and procedures and any other subjects the board may deem useful." Only upon passing this test could one call oneself a software designer. Those who failed would have to stick to pocket calculators or abacuses.



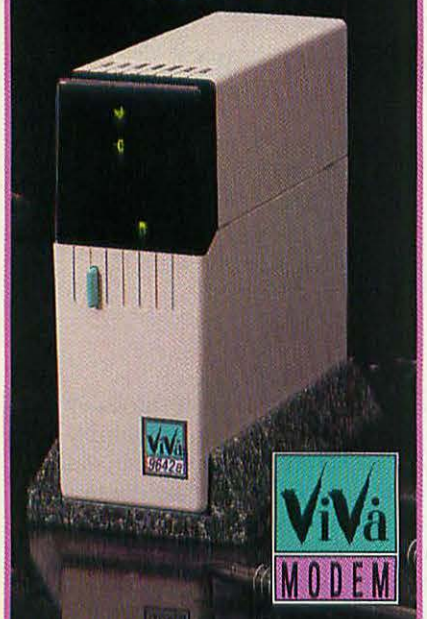
SCOTT BALDWIN

Exempted from this provision are students, federal employees, and those licensed in other states, should New Jersey's colleagues follow suit. The bureaucracy created by this instant industry would be bankrolled by fees charged to those taking the test, as well as fees paid to renew licenses. Every two years, software designers would have to ante up to stay in business.

There is also some language referring to the power to revoke licenses, though it isn't clear exactly what might lead the board to take this action. Cracking copy protection? Trespassing on someone's

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computer? Writing a program that crashes under System 7?

The Making of a Bill

According to Kalik aide Mary Juliana, the genesis of this legislation was a meeting with a constituent, a computer consultant. He had just returned from England, where he took a series of courses in computer programming. After successfully completing these classes, the consultant was given a document that apparently bestowed upon him the title of software designer. (The English, as everyone knows, are big on titles.) When he returned to our shores, however, the consultant was crestfallen to realize that his hard-won status gave him no particular advantage over competitors for programming jobs. Self-proclaimed software designers in Cape May, Leonia, Camden, Teaneck, and Jersey City could simply hang out a shingle, with no government intervention whatsoever! Obviously something was amiss. Could Assemblywoman Kalik do something to help?

Legislators less bold than Ms. Kalik might have asked themselves disturbing questions: Do I know anything about computers or computer programming? Would testing designers really make any difference in the quality of software? Should I infer anything from the fact that I have not heard complaints from unhappy people who patronized unlicensed software designers? Do we really need another government bureaucracy?

If Ms. Kalik had been inclined to seek answers to these questions, she might have discovered that the issue is a swamp into which no sane state government would dare venture. But Ms. Kalik was not so inclined. Perhaps she felt a need to generate her share of those 10,000 annual pieces of legislation. In any case, according to Mary Juliana, Ms. Kalik put the bill into play, without so much as bothering to ask any computer experts if the idea made sense. She sent the idea to the legislative staff in Trenton charged with researching and writing bills. They drafted 4414. Two cosponsors signed on, and in the flurry of activity preceding summer recess, 4414 slipped past a dozing assembly.

It was not until the bill was forwarded to the Senate for the next step in the process that the media reported the nature of this legislation. Only at that point did Barbara Kalik begin her education in software design.

Vox Populi

Kalik's office was swamped with letters and calls from outraged programmers. Several ad hoc coalitions of independent programmers formed to stop the bill. But the big noise came from large New Jersey–based firms who employ hundreds (and in some cases, thousands) of programmers. It happens that AT&T is headquartered in New Jersey, and the communications giant was rather upset at the prospect of approximately 6000 of its software designers being forced to prove to New Jersey that they deserved to keep their jobs. The Independent Computer Consultants Association and the Association for Systems Management also joined the fray.

While self-interest definitely powered the protestors, they had some valid objections, ones that should have been apparent from the start. Despite the bill's claim that it is in the public interest to license software designers, that is far from clear. True, as Kalik's cosponsors ungrammatically complained to the newspapers, "any computer buff in the state can get away with calling themselves a software designer." But companies who hire programmers require degrees from accredited institutions, or they test applicants. And software consumers learn that the mark of reliability is not necessarily programming knowledge, but the willingness of a company to back up its products. In any case, few have theorized that licensing software designers would result in better software—until Ms. Kalik.

Then there is the difficulty of devising a test that could distinguish between "real" software designers and pretenders. Computers are not like plumbing fixtures or building materials, where standard materials, protocols, and goals make testing feasible. Dozens of computer systems and languages are available for programming, and the wild variations in expertise required for different kinds of programs make designing a meaningful

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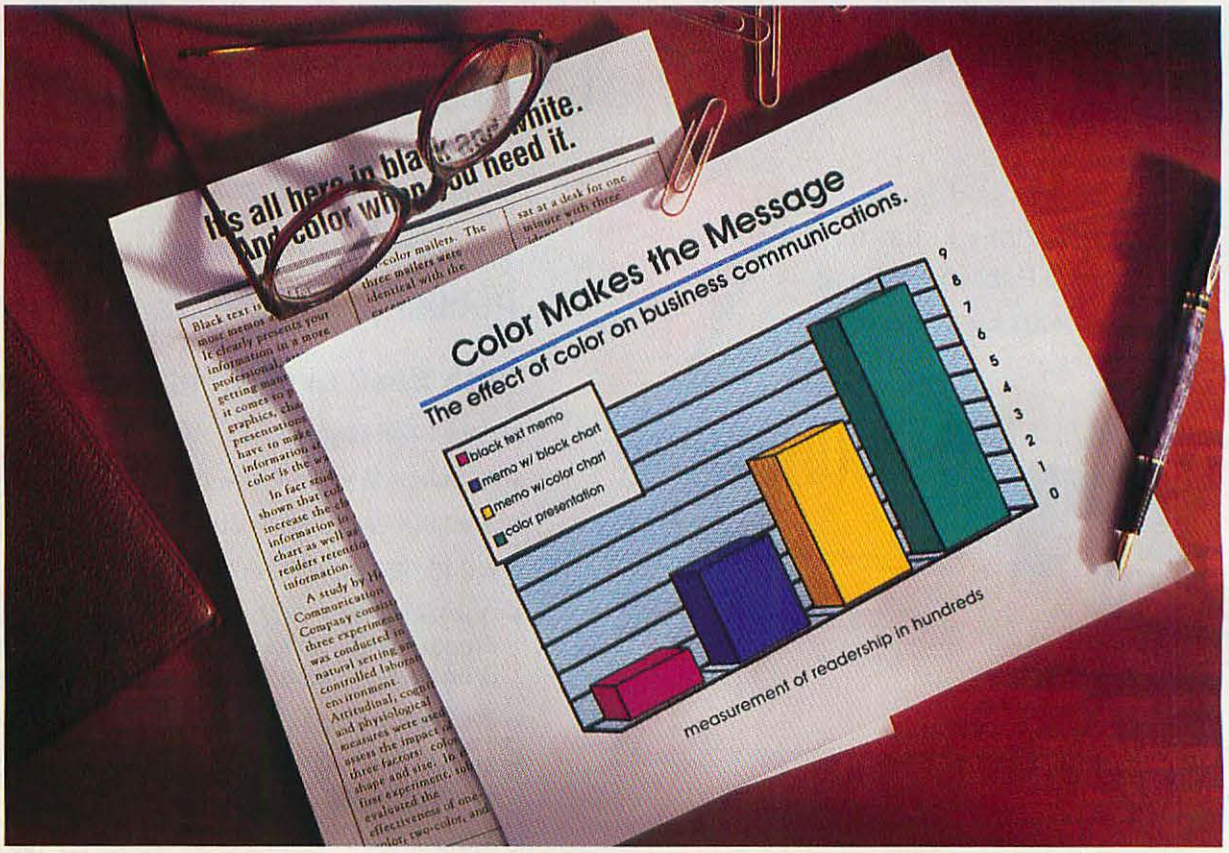
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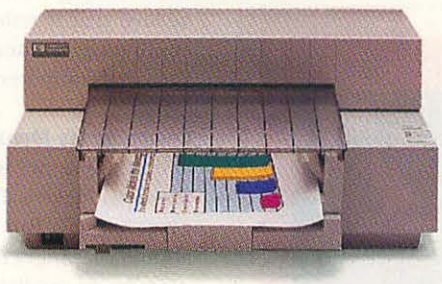
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test next to impossible. How could the same test apply to someone writing dBase templates and someone programming the system controlling railroad switching? The problem is compounded by the bill's refusal to precisely define what is meant by a *software designer*. The term takes on a weird circular logic—it's anyone who passes the test!

Finally, those objecting to the bill note that businesses and independent programmers who don't want to deal with the obstacles that Bill 4414 would throw in their way could simply move out of the state. Obviously, this solution would not serve the public interest in the Garden State.

This organized opposition is already having its effect—no one is actively sponsoring the bill in the Senate, and even New Jersey governor Jim Florio has felt it necessary to assure the critics that nothing hasty will be done as long as he's in charge. In other words, don't start cramming for an exam yet.

But we should not dismiss this as simply a case in which lobbyists stemmed misguided legislation. While I am making merry about this bill, I believe that it reflects a serious, and continuing, misunderstanding of the nature of computers among laypeople.

Computers as Menace

According to her aide, Ms. Kalik professes to make software design more professional. But those who know about computers realize that the lack of imposed rigidity in the field infuses it with a constant stream of vitality. Somehow the United States has managed to become the dominant leader in software design without mandatory professionalism. Bill Gates and Paul Allen were not professionals when they wrote the first microcomputer version of BASIC. Andy Hertzfeld taught himself to program the Apple II, and managed to write the original Macintosh ROM without any certification. Danny Goodman, author of several commercial productivity packages, started out with no programming experience whatsoever. He was a prose writer who exploited the power given to him by the Macintosh and HyperCard to produce useful software.

Goodman's example further demonstrates the folly of licensing software design. Over the next few years more, and more-powerful, programming systems will require fewer and fewer "professional" programming skills on the part of a would-be designer. When, or if, these systems fulfill their promise, people with very little technical proficiency will be able to create sophisticated software packages, ones worth paying for. This is a classic example of what personal computing can do best—bring the power of the professional to the amateur. This ideal has been accomplished in all sorts of tasks, from layout design to video editing, and it has helped increase our national productivity. Bill 4414 would muddy the process by in-

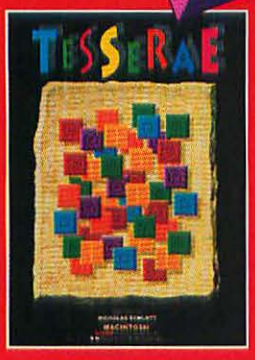
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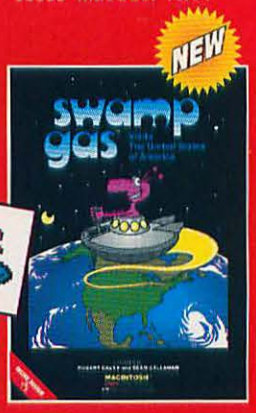
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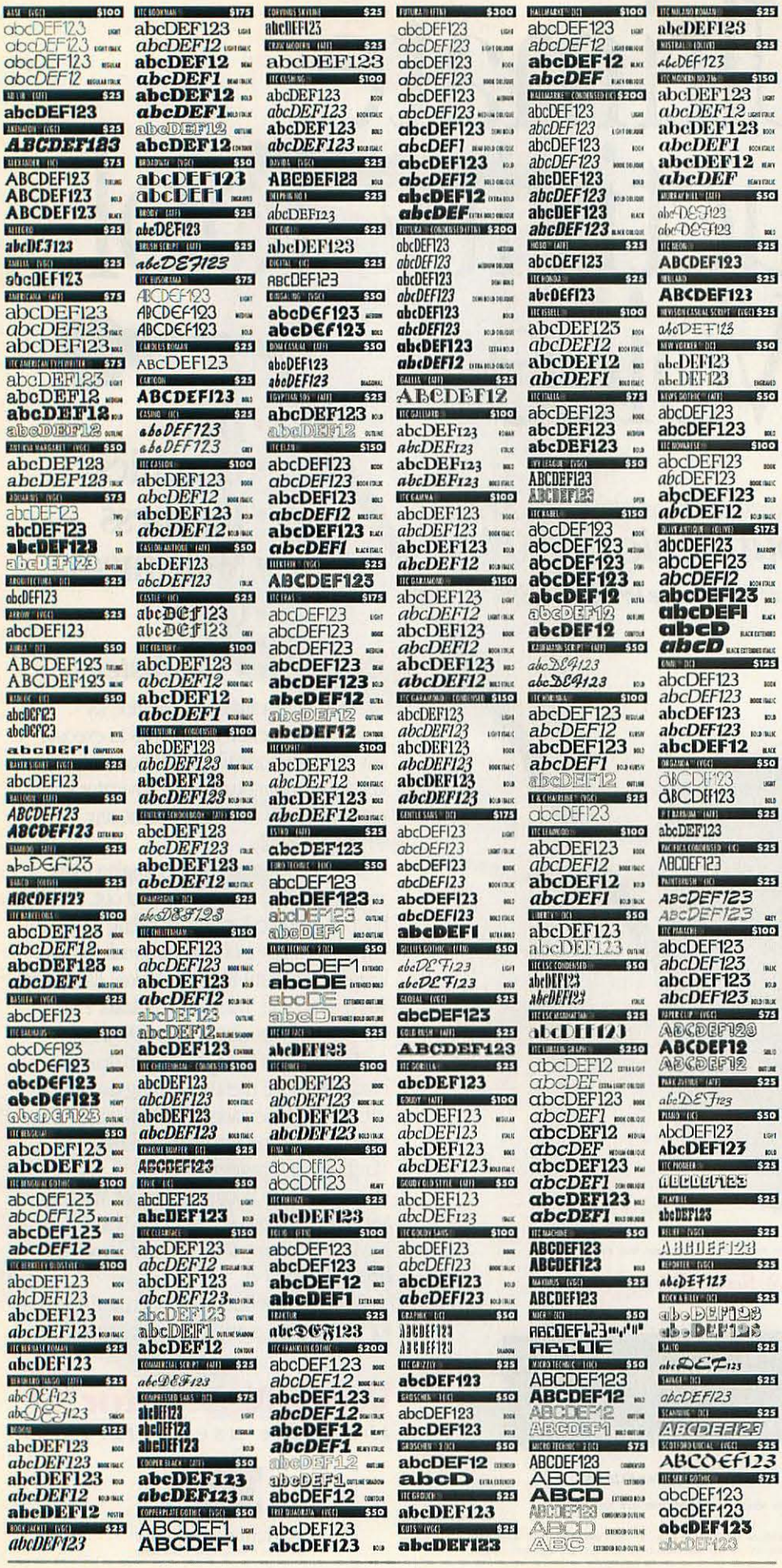
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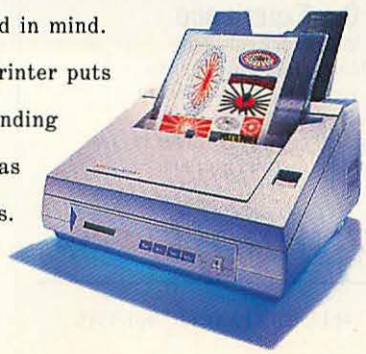


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stalling a cadre of apparatchiks to determine who may or may not participate in the process.

Ms. Kalik thinks public safety would be enhanced by the passage of this law. "There are computers in hazardous or life-threatening areas," explains her aide. "They're involved in designing bridges, or monitoring our health." This is a surprise? It's 1992—computers are involved in almost everything. To many people, this is a scary concept, because they see computers as a menace, evil in and of themselves. They think youngsters use computers only to break into private systems and cause damage. They think computers make up the force behind the invasion of their privacy by credit corporations and government agencies. It is in the interest of those corporations and agencies to encourage this myth, because then scrutiny shifts away from them and into the rooms of young hackers and into the private files of electronic bulletin boards.

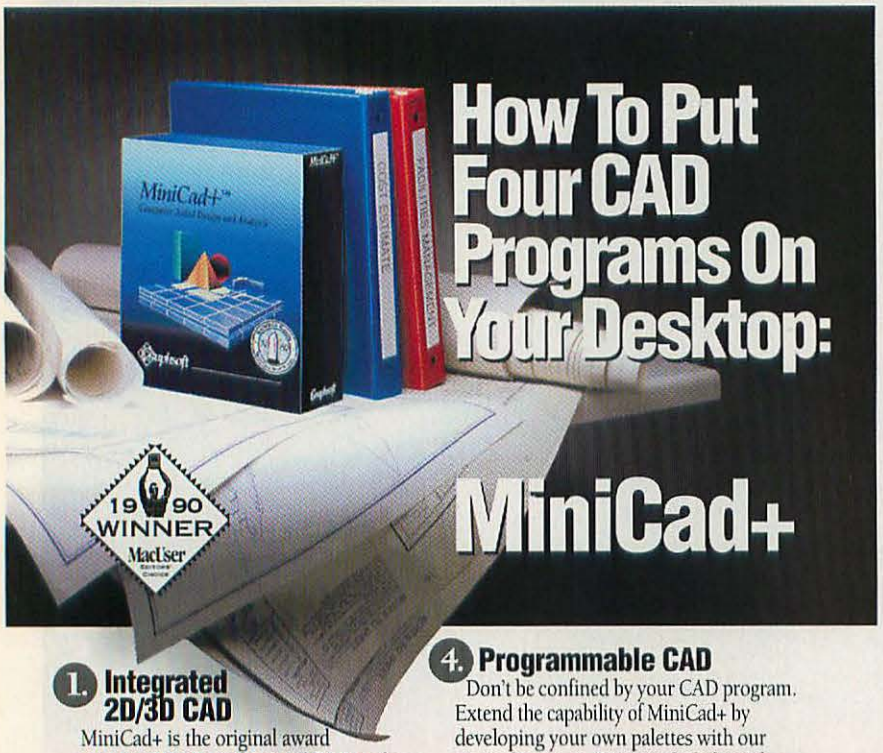
Of course, computers are not the culprits at all. The standards and intents of the people who control them are at issue. If you want to ensure bridge safety, or oversee medical telemetry, you should license the companies who build them. If these firms want to build safe bridges and heart monitors, their managers will take care to hire qualified programmers. If you're worried about computers in credit bureaus, you should pass laws to limit the use of credit records, and enforce penalties on companies that don't keep records accurate. They'll make sure their programs work, then. A government-administered test would be a mere nuisance to people who work for those companies, but would be serious harassment to someone forced to cough up a pile of money to take a test before being permitted to upload a blackjack game on a bulletin board.

Making Amends

As I noted some of these objections to Mary Juliana, she admitted that Bill 4414 might have been more carefully thought out. "I think the problem was that Barbara proposed the bill first and foremost to help a constituent," she says. "It was not the intent to wreak havoc. We're now trying to prevent that [by considering amendments]."

Amendments? I had assumed that in the rush of dealing with 9999 other pressing issues, Ms. Kalik had simply erred on this one and was willing to admit her mistake. But no—even after hearing all the unhappy consequences that would come of her misguided favor to a potential voter, Barbara Kalik still wants to see the bill passed in some form. "She's not backing away from it," said Juliana. Ms. Kalik, please—back away from it. Your energies could then be directed to a bill devoted to something we really need: licensing state legislators. M

Macworld columnist Steven Levy is writing a book on artificial life.

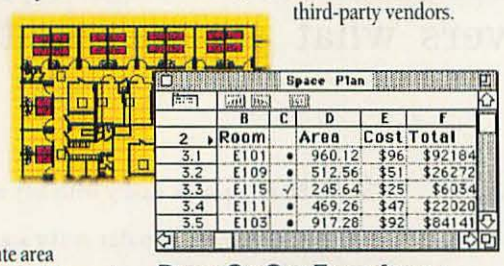


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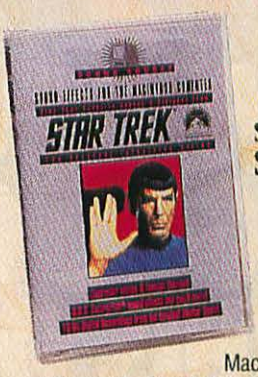
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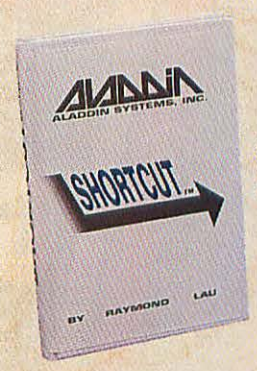
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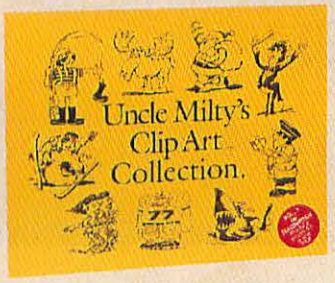
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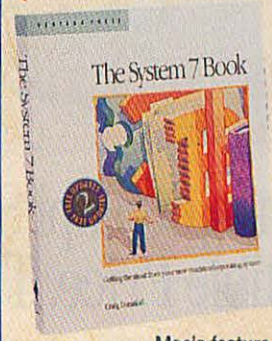


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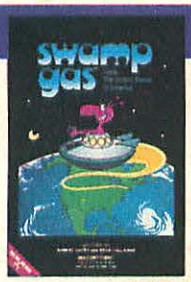
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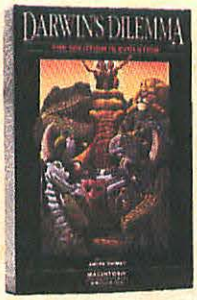
$44 Mutant Beach

Animated, full-color interactive action adventure stars Native Nick, a laid-back islander. He must overcome mutated creatures, traps, false paths, and locked gates, to return the stolen nose to his island's idol. Users of System 7.0 also get four-channel multi-track sound! #04252



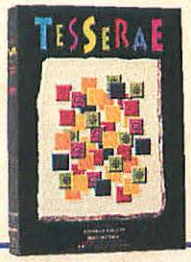
$32 3 in Three

In this animated color puzzle game a number 3 has become lost inside the CPU of a computer, and wants to find its way back to its spreadsheet. To help it on the way, you must solve a score of original brain-teasing puzzles. #03599



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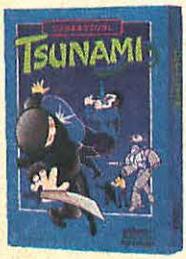
Eliminate tiles from a board according to color and texture. Get down to one tile, and a more difficult arrangement appears! Advanced players try to improve scores by using the fewest possible moves. #03934



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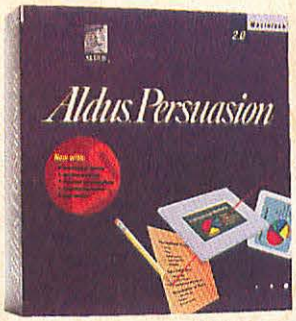
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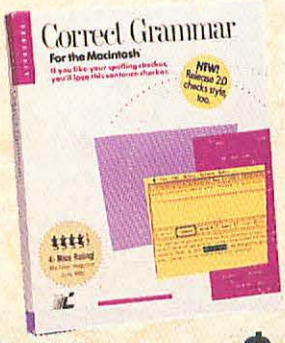
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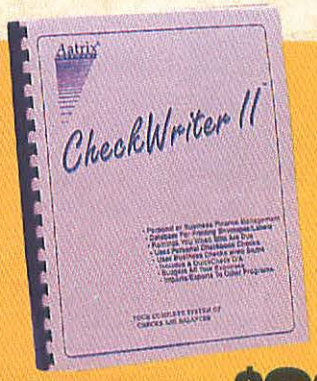
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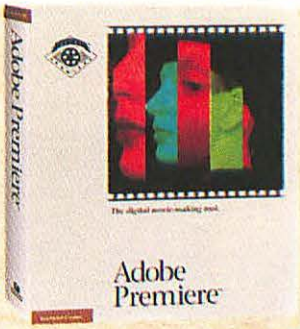
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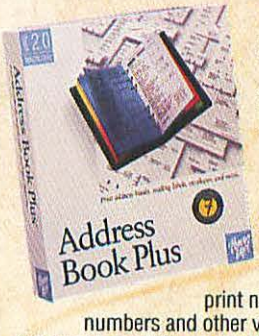


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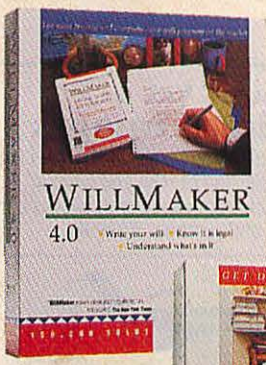
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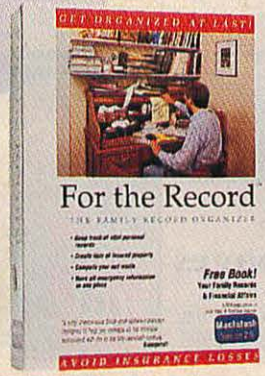
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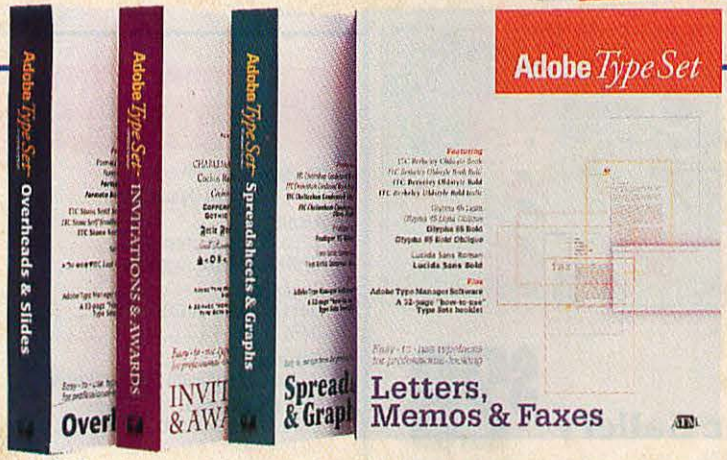
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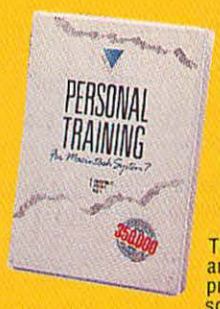
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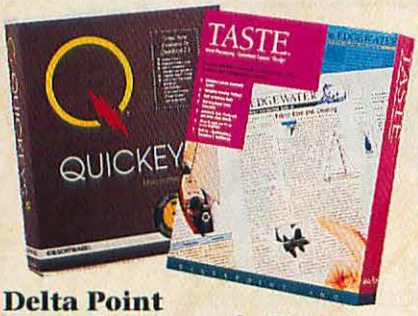
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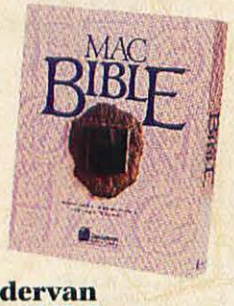
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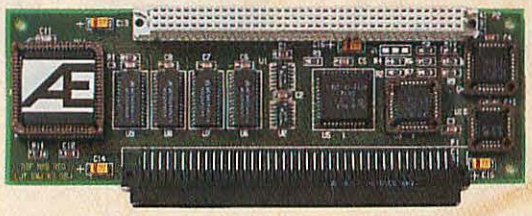
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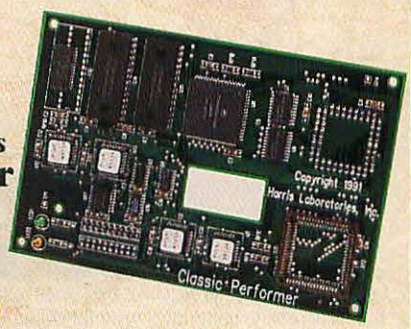
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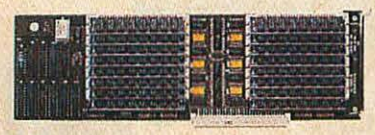
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Accelerators (prices are without FPU unless indicated)

Applied Engineering

03824	MacRam Classic 1 mb Upgr.	94
04120	Fast Math LC	139
00289	Cache In IIci Cache Card	194
03673	Quadralink w/Shadow	208
04154	QuickSilver IIsi with FPU	308
03675	Mac Portable 1mb SRAM	349
04153	TransWarp SE 25Mhz (no FPU)	689
04325	TransWarp SE 25 Mhz with FPU	799
04732	TransWarp LC 33 Mhz with FPU	999
04735	TransWarp SE 40 Mhz with FPU	1499

Connectix

02652	Virtual W/PMMU Mac II	184

Daystar

04181	Fast Cache IIsi	299
02877	Fast Cache IIci	278
03729	SCSI PowerCard w/o SIMMS	1199
03730	RAM PowerCard w/o SIMMS	499
04323	Universal PowerCache 33Mhz	749
04321	Universal PowerCache 50 Mhz	1499
04319	Universal PowerCache 40 Mhz	948
04182	Dual Port IIsi	104

Dove

03230	030 Upgrade /Plus	528
03820	030 Upgrade/ SE	429
03818	MacSnap 596XS 512KE 4MB w/SCSI	455

Fusion Research

00508	TokaMac SX	2195

Motorola

02723	68882 Math Coprocessor 50 Mhz	329

PLI

00811	Quick SCSI	399

Radius

04207	Rocket	1799

SIMMS

04737	1 Mb 80 ns ($ per MB)	42
03586	1 Mb FX 80 ns	49
03584	4X4 Mb '020	799
03583	4X4 Mb '030	699
03579	1X4 Mb FX 80 ns	169
03585	4X4 Mb FX 80ns	759
00014	LC Simms (two 2MB)	189

Sigma

04220	Bullet 030 50Mhz w/Double UP	1399
00215	Double UP Board	167

Total Systems

Mac Plus

02899	Gemini Kit	125
00036	Mercury 16Mhz-Plus	518
00048	Mercury SCSI Module-Plus	188
02902	Gemini 20 Mhz	795
02903	Gemini 25 Mhz	1199

Mac SE

00043	Mercury 16Mhz-SE	388
00531	Gemini Ultra 33Mhz	1379
00535	Gemini Ultra 40 Mhz	1479
04005	Galileo Video Card	399

Mac Classic

00527	Gemini Classic 20 Mhz	949
00529	Gemini Classic 25 Mhz	1179
00532	Gemini Classic 33 Mhz	1449
00538	Gemini Classic 40 Mhz	1549
00546	Gemini Classic 50 Mhz	1699

Other

00545	Enterprise LC 030 (Mac LC)	609
00291	Magellan 040 (Mac IIsi)	1995
00295	Magellan 040 (Mac IIci)	2195

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WordPerfect Office V.3.01 — $92

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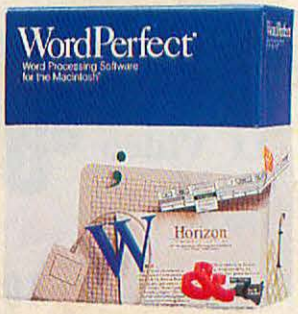


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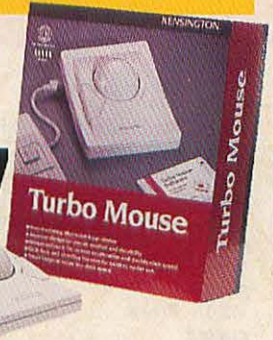
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00451 Hayes Personal Modem 148
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00028 Lexus 2400Bps Mini Modem 89

Microcom
03615 Microcom Mac Modem V.32 MNP 5 ... 688

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04035 Practical Modem 9600 Sa-Mac 569

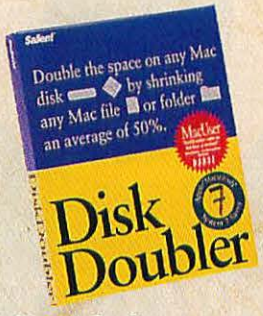
Prometheus
04416 2400 Mini Plus 123
03311 Promodem MNP 5 2400 II Intrl 245
03319 Promodem 24/96 Fax Msr 294
03312 Promodem 2400 Mini-M 118
03608 Promodem 9600M Plus 598
00062 Promodem Ultima 689

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Supra Corp
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02003 Supra Modem 2400 Baud 118
03368 Supra Modem 2400 Macpac 178
00065 Supra Modem 2400 Plus 179

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02554 T-2500 V.42 Rel 6.01 19000 Bps 1050

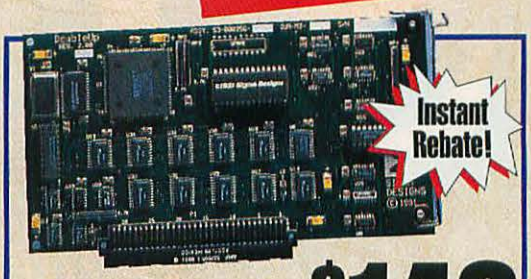
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FWB's PocketHammer 100 is rated the fastest 100Mb drive by *MacWorld*, and the 50Mb was rated as the fastest 50Mb drive by *MacUser* Labs. FWB backs its engineering excellence with a 2-year warranty on all Hammer hard drives. #00506

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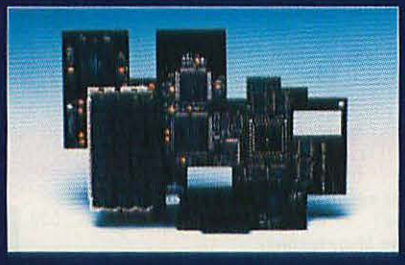
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Circle 294 on reader service card



Saints and Sinners Revealed

A ROUNDUP OF GOOD DEEDS—AND BAD—AMONG MACINTOSH COMPANIES

BY DEBORAH BRANSCUM

Nearly every month I run a Service Hero box lauding a particular company's excellent customer service, based on a letter from one of our readers. The good judgment shown by these companies deserves recognition, but so does bad judgment. This column marks the first annual assessment of industry saints and sinners. The halo icons below denote companies that have exhibited angelic behavior, while the horns indicate examples of devilishly poor decisions.



HANK OSUNA



Aldus deserves a set of horns for not alerting PageMaker 4.0 users that hairline rules used in the program's Table Editor might not print on a Linotronic printer. Adding insult to injury, the bug was ignored in an article on the Table Editor, published in the September/October 1991 issue of *Aldus* magazine. But the company also wins a halo for reimbursing at least one PageMaker user for the additional printing expenses caused by the Table Editor bug.



Apple wins both a halo and horns for being both naughty and nice. The company is distributing Connectix's Mode32 software to Macintosh II, IIx, IIcx, and SE/30 owners at no charge so they can finally access more than 8MB of RAM under System 7. But Apple initially refused to give customers this capability. Apple also has finally acknowledged the importance of PostScript by promising to incorporate Adobe Type Manager in System 7. But first Apple led the industry on a wild (and expensive) goose chase after a TrueType page-description language standard. On the nice side, Apple made its developer group, APDA, more accessible by dropping annual subscription fees.



TBSP (The Better Software People) deserves horns for a dismal refund policy. If TBSP's Stock program does not run at all on a customer's computer and the problem is reported within 30 days, the user receives an 85 percent refund. Otherwise, no refund—even if the program is incompatible with a user's printer or modem.



Claris deserves a set of horns for a special promotion last summer that offered buyers of MacWrite II a free copy of Correct Grammar (by Writing Tools Group). The bundled version of Correct Grammar worked only with MacWrite II files; several customers thought they were getting the commercial version of Correct Grammar, which works with many file formats. Claris also earns a halo for responding to the complaints by giving dissatisfied customers fully functional versions of Correct Grammar and shipping the commercial version with future offers.



Computer Era, a huge Apple-authorized dealer in New York City, deserves horns for a bad attitude. When a *Macworld* staffer called in an attempt to help resolve a consumer complaint, no one at Computer Era was willing to give us the *(continues)*

name of the company's president. We were forced to call the New York State Board of Corporations to learn that Computer Era's president is Erwin Haas.

DeltaPoint and *SuperMac* deserve horns for releasing seriously buggy software—Taste and PixelPaint Professional 2.0, respectively. Other companies that deserve horns for particularly buggy products include *Quark* for QuarkXPress 3.0, *Radius* for Impress It, *Deneba* for Canvas 2.1, and *Mouse Systems* for its initial version of the PageBrush optical mouse-scanner. But SuperMac also earns a halo for including a list of known bugs with the shipping product.

Most Macintosh companies, both hardware and software, deserve horns for refusing to acknowledge bugs. Many software companies release bug fixes without changing version numbers or announcing an upgrade. *Ventura Software,* for example, didn't notify its Macintosh users about the 3.01 patch for System 7. Some users found out about the update after Ventura crashed under 7 and they called tech support to find out why.

Electronic Arts deserves horns for failing to update its manual for the Macintosh version of Earl Weaver Baseball. Instead, it shipped a 12-page Mac supplement with the 66-page DOS manual. Worse yet, the first item in the supplement listed all the DOS features dropped from the Mac version.

Fifth Generation Systems earns a halo for its customer-support standards that include a pledge that all products sold by the company will perform as promised (a nice touch in an era of "I'm not responsible" software licenses). It also includes a one-year, money-back, no-questions-asked return policy and 24-hour toll-free support.

Golden Triangle Computers and *Opcode Systems* each win halos for their upgrade policies. Golden Triangle sent registered users a free upgrade to DiskTwin that included a new ROM chip, software, and a manual. Opcode provides free upgrades to its software, which include rewritten manuals.

Great Plains Software wins a halo for its policy of a guaranteed one-hour response time to technical-support calls.

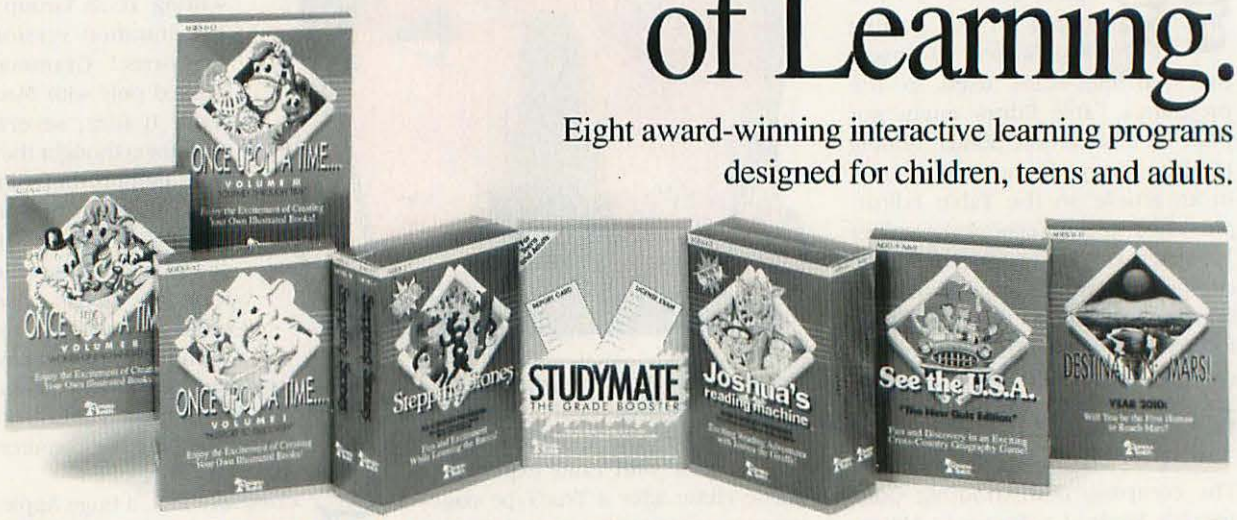
MacFriends deserves horns for advertising a 40MB hard drive "with genuine Apple mechanism" in the October issue of *Macworld.* The drive might have an Apple label, but Apple doesn't manufacture drive mechanisms—it acquires them from other companies.

Microsoft deserves horns for waiting years to upgrade Works and Flight Simulator.

Que deserves horns for publishing a book in June 1991 with the same title as Robin Williams's *The Little Mac Book,* published by Peachpit Press in April 1990. *(continues)*

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3 Free Solutions.

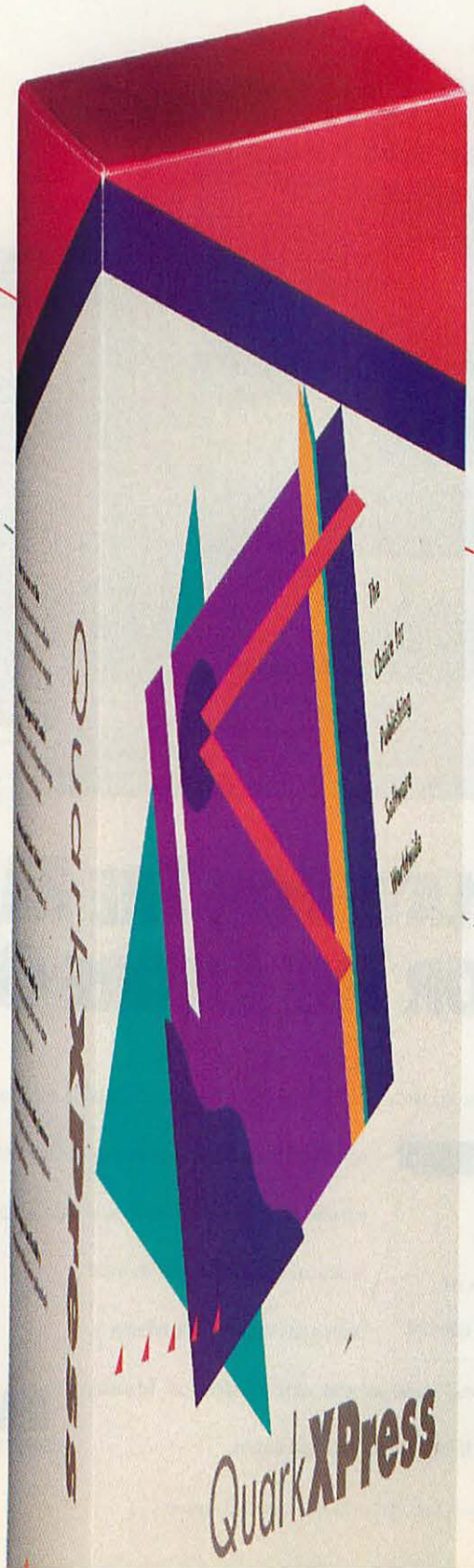
Quark has developed a series of free Quark XTensions, including PM Import, which lets you import PageMaker® files directly into QuarkXPress, and the Cool Blends XTension, which lets you create radial and irregular blends in QuarkXPress 3.1. These XTensions will be available free through on-line services and sent free to QuarkXPress users under the One-Year Service Plan.

4 Strong Support.

Depending on which Quark Service Plan you choose, you can receive toll-free technical support, free or substantially discounted upgrades, and a free subscription to Quark's how-to newsletter, *Expressions*.

5 On-Line Assistance.

In addition to the technical support you can receive with Quark's Service Plans, Quark personnel are available — free — for questions on all the major on-line services, including CompuServe's DTP Forum, America OnLine, Connect, and AppleLink.



6 QuarkEd.

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8 Priority Service.

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9 Trouble-Free Output.

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Circle 295 on reader service card

Although it may not have been Que's intention, two books with the same title can only confuse readers and potential buyers of both volumes.

Both *RasterOps* and *SuperMac* win halos. RasterOps has three-year warranties on its entire product line. SuperMac offers a three-year warranty on its boards and a five-year warranty on its monitors.

SyQuest deserves horns for manufacturing an 88MB removable cartridge device that won't write to cartridges from the company's 44MB model drive. Whatever happened to compatibility?

The U.S. Postal Service gets horns because it will convert a company's database file to Zip+4 format one time free of charge—if the file is in a DOS-based database. Mac owners have to go to a third-party vendor and pay 7.5 cents per record.

That's my list of saints and sinners for this year. My apologies if time and space constraints mean that some sins have been overlooked and some good deeds have gone unrecognized. But don't despair—I'll try to catch up with them next year. ■

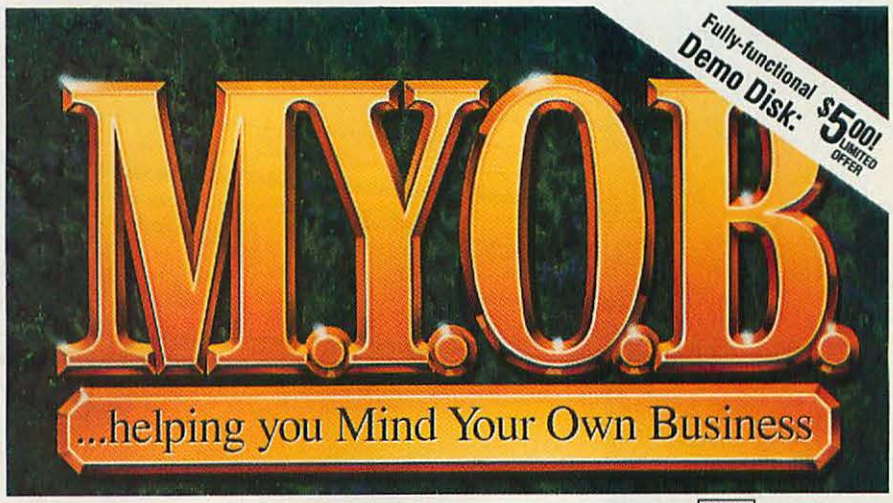
(Research assistance by Carolyn Bickford.)

Send nominees for sainthood to Service Heroes, Macworld, *501 Second St., San Francisco, CA 94107, or via AppleLink (Macworld1) or America Online (Branscum). Conversely, drop* Conspicuous Consumer *a line if a company is ignoring you.*

SERVICE HEROES

Ofer Ben-Amots of Philadelphia writes to share his experience with Mirror Technologies after purchasing a Pixel View 1 Portrait Display for his Mac Plus. "During installation of the video card, something went wrong," writes Ben-Amots. "The Sad Mac face kept appearing on the screen." Mirror's tech-support department asked him to send his computer to the company in Roseville, Minnesota. "A week later I received it back clean and neat as a new computer . . . ready to be connected to the monitor."

William W. Morgan, a reader in Manama, Bahrain, writes that he prefers to buy from U.S. companies but finds that customer service is often a problem for overseas residents. Thus he was pleasantly surprised in dealing with Keri Moisa after buying a flawed Toshiba CD ROM drive from Educorp Computer Services. "Toshiba, while initially helpful, rapidly lost interest," writes Morgan. "Educorp then agreed to pay return shipping via Federal Express *and* shipment of a replacement unit at a cost which vastly exceeded any possible profit on the order."



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Accounts Payable — Purchase order control • Auto-calculate taxes • Auto discounts • Easy posting • Multiple payments • Auto purchase journal

Inventory — Retail items • Service items • Manufacturing items • Auto pricing • Inventory analysis • Auto adjustments

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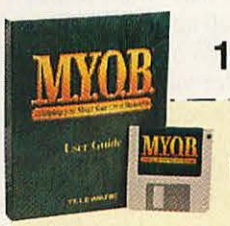
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UPDATES

This section lists the latest versions of selected Mac applications that were announced by the time we went to press. To have products considered for this section, send a press release to Updates, Macworld, *501 Second St., San Francisco, CA 94107, or fax it to 415/442-0766.*

PRODUCT	V.	REQ.	★	$
4TH DIMENSION	2.2	1MB/6.0		$99
A4	3.0	2MB/6.0.5		$395
AATRIX CHECKWRITER II	3.02	512K/4.1		*
ACCOUNTANT, INC. PROFESSIONAL	2.1	1MB/6.0.3		*
ACCUTEXT	2.0	4MB/6.0.2		*
ACTA 7	7.0	512KE/6.0.5		$33.50
ADDMOTION	1.0	2MB/6.0.5		NA
ADDRESS BOOK PLUS	2.0	1MB/6.0.2		$25
ADOBE ILLUSTRATOR	3.2	2MB/6.0.3	2/91	*
ADOBE PHOTOSHOP	2.0	2MB/6.0.2	9/91	$199
ADOBE TYPE MANAGER	2.0	1MB/6.0.2		FREE
AFTER DARK	2.0	512KE/4.1	5/91	*
AGFATYPE	3.0	2MB/6.0.2		FREE
ALARMING EVENTS	1.0.3	1MB/6.0.2	11/91	$15
ALDUS DIGITAL DARKROOM	2.0	1MB/6.0	9/91	*
ALDUS FREEHAND	3.0	1MB/6.0.3	6/91	*
ALDUS PAGEMAKER	4.0.1	1MB/4.1		FREE
ALDUS PERSUASION	2.0	1MB/6.0.5		*
ALDUS SUPER 3D	2.5	2MB/6.0.5		*
ALDUS SUPERPAINT	3.0	1MB/6.0.5		$65
AMAZING PAINT	1.0.1	512KE/6.0.4		$15
ANTITOXIN	1.4	512K/3.2		$15
APPLESHARE FILE SERVER	2.0	512K/3.2		*
ASHLAR VELLUM	2.0	4MB/6.0.2		$95
ATONCE	1.2	1MB/6.0.5		*
AUDIOMEDIA	2.02	2MB/6.0.7		$29
AURACAD	3.01	1MB/4.0		$90
AUTOSAVE II	2.0	512KE/4.2		*
AUX	2.0	4MB/6.0.5		*
AZIMUTH	2.0	1MB/6.0.2		$45
BACKFAX	1.5.1	1MB/6.0.3		$25
BACKMATIC	2.0	1MB/4.2		*
BILL-IT	2.6	1MB/6.0.3		*
BITSTREAM TYPEFACE LIBRARY	2.0	1MB/6.0		*
BUSINESS SENSE	1.4.1	1MB/6.0		*
CA-CRICKET PRESENTS	2.0.1	1MB/6.0		*
CALENDAR	1.1.2	512KE/6.0	11/91	FREE
CANOPENER	1.1	512K/3.0		FREE
CANVAS	3.0	1MB/6.0.2	1/92	*
CAPTURE	4.0	128K/4.1		$30
CARBON COPY MAC	2.0	1MB/6.0.5		*
CAT III	1.1	1MB/6.0		*
CLARIS CAD	2.0.2	2MB/6.0		$79
CMS UTILITIES	7.0	2MB/7.0		$25

PRODUCT	V.	REQ.	★	$
COLOR MACCHEESE	2.07	1MB/6.0.5		$15
COLORSTUDIO	1.5	4MB/6.0.5		*
COMPUSERVE INFORMATION MANAGER	1.5	1MB/4.1		*
COMPUSERVE NAVIGATOR	3.0.4	512K/4.1		*
CONCERTWARE+	4.0	512KE/4.2		$15
CORRECT GRAMMAR	2.0	1MB/4.2		*
DATACLUB CLASSIC	2.0	2MB/6.0		*
DATA SHAPER	1.2	1MB/6.0		$40
DECK	1.03	2MB/6.0.7	4/91	FREE
DELTAGRAPH PRO		2MB/6.0.5		$75
DELUXEMUSIC CONSTRUCTION SET	2.5	512K/6.0.2		*
DESCARTES	1.04	2MB/6.0.3	6/91	FREE
D.E.S. DOCUMENT EXCHANGE SYSTEM	4.1	1MB/6.0		*
DESIGNCAD	3.0	2MB/6.0.5		*
DESIGNCAD 2D/3D	3.0	2MB/6.0.5		$50
DESIGNSTUDIO	2.0	1MB/6.0	11/91	*
DESKPAINT	3.03	1MB/4.2		FREE
DIGITAL DARKROOM	2.0	1MB/6.0.4		$80
DISKDOUBLER	3.7	1MB/6.0.2		$15
DISKEXPRESS II	2.07	1MB/6.0		*
DISKFIT PRO	1.1	1MB/6.0	7/91	$32.50
DISKTOP	4.01	1MB/6.0		*
DISPLAY ADBUILDER	1.1	1MB/6.0.3		*
DOLLARS & SENSE	5.0	512KE/3.2		*
DOUBLE HELIX	3.5	1MB/6.0		$99
DREAMS	1.1	1MB/6.0.2		*
DYNAPERSPECTIVE	2.04	2MB/6.0.4		FREE
DYNODEX	2.0	1MB/6.0		$25
EASY COLOR PAINT	2.0	1MB/6.0.2		*
EMPOWER II	4.0.7	2MB/4.2		*
ENCORE	2.0.7	2MB/6.0.2		*
ENHANCE	2.0	2MB/6.0.3	11/91	$50
EVOLVE	1.1	2MB/5.3		$25
EZ VISION	1.0	1MB/6.0.3		NA
FASTBACK PLUS	2.6	1MB/6.0		*
FAST FORMS	2.0	1MB/6.0		$25
FASTLABEL	2.02	1MB/6.0		*
FASTTRACK	1.5	512KE/5.5		$20
FAXGATE (MICROSOFT MAIL)	3.0	1MB/6.0.5		$9/workstation
FAXGATE (QUICKMAIL)	1.5	1MB/6.0.5		$9/workstation
FILEGUARD	2.7	1MB/4.2		$18
FILEMAKER PRO	1.02	1MB/4.2	2/91	FREE

PRODUCT	V.	REQ.	★	$
FILEVISION V	1.1	1MB/6.0.2		*
FILMMAKER	2.5	5MB/6.0.3	3/91	*
FINALE	2.6	1MB/6.0.2		FREE
FINDSWELL	2.01	512KE/3.2		*
FLEXICAD	2.20	5MB/6.0.4		*
FONTMONGER	1.0.5	2MB/6.0.2	10/91	FREE
FONTOGRAPHER	3.3	1MB/4.0.3		*
FONTSHARE	2.2	1MB/6.0		FREE
FONTSTUDIO	2.0	1MB/6.0.5		*
FORM Z	2.0	2MB/6.0		*
FOXBASE+/MAC	2.01	1MB/6.0		FREE
FRAMEMAKER	3.0	1MB/6.0		*
FREEDOM OF PRESS LIGHT	3.0.1	2MB/6.0.3		FREE
FREEDOM OF PRESS PROFESSIONAL	3.0.2a	4MB/6.0.3		$250
FULL IMPACT	2.0	1MB/6.0		$50
FULLWRITE PROFESSIONAL	1.5	2MB/6.0.2		*
GENERIC CADD	1.1	1MB/6.0.5		*
GEOQUERY	2.03	1MB/6.0		$125
GOFER	2.0	1MB/4.1		$25
GRACELAN	2.0	1MB/6.0.5		*
GRAMMATIK MAC	2.05	1MB/6.0		$15
GREAT GANTT	1.4	1MB/6.0		*
GREAT PLAINS ACCOUNTING SERIES	6.0	1MB/4.2		*
GUIDE	2.0	512K/4.1		$50
HAND-OFF II	2.2	1MB/6.0.5		$35
HYPERCARD	2.1	1MB/6.0.3		$49
HYPERDA	2.0	512K/3.2		*
ICON-IT	2.1	1MB/6.0.2		*
IF:X FORMS DESIGNER	1.1	1MB/6.0		FREE
IGOR	1.2	2MB/4.1		$35
IMAGESTUDIO	1.7	1MB/6.0		$99
INFINI-D	1.1	4MB/6.0.4	9/91	FREE
INFOLOGIC ENVELOPE	1.1C	512KE/4.0		$5
INITPICKER	2.02	1MB/6.0		$10
INSIGHT EXPERT ACCOUNTS PAYABLE	2.1.1	1MB/6.0		*
INSIGHT EXPERT ACCOUNTS RECEIVABLE	2.2	1MB/6.0.2		*
INSIGHT EXPERT GENERAL LEDGER	2.2	1MB/4.2		$99
INSPIRATION	3.0	1MB/4.2	12/91	*
INSTANT-EXPERT PLUS	2.0	1MB/5.0		FREE

(continues)

V. = version #. **Req.** = min. RAM and system software required.
★ = last time (in the past year) this or an earlier version reviewed.
NA = first version, not applicable.

$ = cost of update to registered owners.
* = contact your dealer for update policy.

Blue = new version.
Yellow = reviewed product.

PRODUCT	V.	REQ.	★	$
INTERFACE RAVE	2.0.5	2MB/6.0.4		FREE
INTOUCH	1.1	512KE/4.2	5/91	FREE
ITHINK	2.0	2MB/6.0.2		$149
KALEIDAGRAPH	2.1	2MB/6.0.5	9/91	$20
KIWIENVELOPES	3.1	512KE/4.1		*
LABVIEW	2.2	4MB/6.0.3	10/91	*
LAPLINK MAC III	3.2	512K/2.0		FREE
LAPLINK MAC PLUS III	3.0	512K/2.0		*
LASERPAINT COLOR II	1.02	1MB/6.0.3		FREE
LETRASTUDIO	2.0	2MB/6.0		*
LIGHT CHECKBOOK ACCOUNTING	2.0	1MB/6.0.3		*
LIGHTSPEED COLOR LAYOUT SYSTEM	2.5	1MB/6.0.5		*
MACANALYST	2.0	2MB/6.0		$125
MACARCHITRION	5.5	2MB/6.0.3		*
MACDRAFT	2.1	1MB/6.0.2		*
MACDRAW II	1.1	1MB/6.0		*
MACDRAW PRO	1.0	1MB/6.0.5	11/91	$99
MACENVELOPE	5.1	1MB/4.2		$29.95
MACENVELOPE PLUS	2.0	512KE/3.2		$50
MACFLOW	3.5.4	1MB/6.0		$30
MACFORTRAN II	3.1	4MB/6.0.3		$99
MACLINKPLUS/PC	5.0	1MB/6.0.2		*

PRODUCT	V.	REQ.	★	$
MACMONEY	3.5	512KE/4.0		$12
MACPAINT	2.0	512KE/3.2		$25
MACPHONEBOOK	3.0	1MB/6.0	9/91	*
MACPROJECT II	2.5	1MB/6.0		$99
MACRECORDER	2.03	512K/3.2		*
MACRENDERMAN	1.1	5MB/6.0.5		$75
MACROMIND DIRECTOR	3.0	2MB/6.0.5		$195
MACSCHEDULE	2.5	1MB/6.0		$30
MACSCHEDULE PLUS	1.0.5	1MB/6.0		FREE
MACSPIN	3.01	512K/4.3		*
MACTERMINAL	3.0	512K/3.2		$65
MACTOOLS DELUXE	1.2	1MB/6.0		*
MACTOPS	3.1	1MB/6.0.5		*
MACWRITE II	1.1	1MB/6.0		FREE
MANAGING YOUR MONEY	4.0	1MB/6.0.3		*
MANAPRO GENERAL LEDGER	3.1	1MB/6.0		NA
MAPGRAFIX	2.1.1	4MB/6.0.3		*
MARCOPOLO	1.1	1MB/6.0		FREE
MARKET MASTER	3.0	1MB/6.0.3		$95
MARKUP	1.03	1MB/6.0		FREE
MASTERFINDER	1.1	1MB/6.0.5	6/91	*
MASTERPLAN	1.03	512K/6.0.5		FREE
MASTER TRACKS PRO	4.52	1MB/6.0.2		*

PRODUCT	V.	REQ.	★	$
MATHCAD	2.06	1MB/6.0.2		FREE
MATHEMATICA	2.0	1MB/6.0		*
MATHTYPE	2.1.1	512K/6.0.2		*
MATHWRITER	2.0	2MB/6.0.5		*
MEDIATRACKS	1.01	1MB/6.0.2		FREE
META PRO	2.03	1MB/6.0		*
MICHAEL'S DRAW	1.0	1MB/6.0.5	12/91	NA
MICROPHONE II	3.0	512K/4.2		*
MICRO PLANNER MANAGER	1.0	1.5MB/4.0		*
MICROSOFT EXCEL	3.0	1MB/6.0.2	9/91	*
MICROSOFT FILE	2.0	512K/3.2		*
MICROSOFT MAIL	3.0	1MB/6.0.2	8/91	*
THE MICROSOFT OFFICE	1.5	1MB/6.0.2		$129
MICROSOFT POWERPOINT	2.01	1MB/6.0		FREE
MICROSOFT PROJECT	1.1	1MB/6.0.4	11/91	NA
MICROSOFT WORD	4.0	512KE/3.2		*
MICROSOFT WORKS	2.0	512K/6.0		*
MINDLINK	2.0	1MB/6.0		*
MINDWRITE	2.1	512KE/4.2		*
MINICAD+	3.1	1MB/6.0	7/91	*
MOCKPACKAGE PLUS UTILITIES	4.4	512KE/3.2		$15
MODELSHOP II	1.1	1MB/6.0.2		FREE
MORE	3.1	1MB/4.1		*
MULTI-AD CREATOR	2.0	2MB/6.0.3		*

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PRODUCT	V.	REQ.	★	S
MULTICLIP	2.1.7	512K/6.0.2		*
MULTILEDGER	1.1	512K/3.2		$75
MUSICPROSE	2.1	1MB/6.0		FREE
MUSIC PUBLISHER	2.5.2	1MB/6.0	12/91	$15
MYADVANCEDMAILLIST	3.0	512K/4.1		*
MYDISKLABELER III	3.0.4	1MB/6.0		*
M.Y.O.B.	2.0	1MB/6.0	10/91	*
MYTIMEMANAGER	4.0	1MB/6.0.3	11/91	*
NETMINDER ETHERNET	1.2	2MB/6.0		*
NETWORK BUNDLE FOR THE MAC	3.0	512K/3.2		*
NETWORK SUPERVISOR	2.0	2.5MB/6.0.3		*
NISUS	3.05	1MB/6.0.2	2/91	*
THE NORTON UTILITIES FOR THE MACINTOSH	1.1	1MB/4.2	2/91	$19
NOW UTILITIES	3.0	1MB/6.0.4	7/91	$29
NUBASE FOR THE MAC	1.3	1MB/4.1	1/92	$75
OCTAVO TYPECHART	1.5	1MB/6.0.4	7/91	FREE
OMNIPAGE	3.0	4MB/6.0		$25
OMNIS 5	1.2	1MB/6.0		*
ONCUE	1.3	512K/4.2		$10
ON LOCATION	2.0	1MB/6.0.5		$25
ON SCHEDULE	2.0	1MB/3.0		*
PANORAMA	1.5	1MB/4.2		$29.95

PRODUCT	V.	REQ.	★	S
PAYROLL	4.0	2MB/6.0.5		$89
PERFORMER	3.61	2MB/6.0.2		*
PERSONAL PRESS	1.01	1MB/6.0.2		FREE
PHONENET LIAISON	3.0	1MB/4.2		$75
PHOTOMAC	1.5	2MB/6.0.3		$75
THE PHRASE THESAURUS	2.0	1MB/6.0		FREE
PICTUREPRESS	2.0	2MB/6.0.4		*
PIXELPAINT	2.1	2MB/4.1		*
PIXELPAINT PRO	2.01	4MB/6.0.5	9/91	$125
PLAINS & SIMPLE	1.06	1MB/3.2		*
PLANISOFT	1.3	512K/4.2		$48
POWERDRAW	3.0	1MB/6.0		*
POWERSTATION	2.5.5	512K/4.1		*
PRACTICA MUSICA	2.2	512K/3.2		*
PRESENTER PROFESSIONAL	1.0	5MB/6.0.5		NA
PRO-CITE	2.0	1MB/6.0.2		$95
PRODIGY	3.1	1MB/6.0		FREE
PROFESSIONAL COMPOSER	2.3	1MB/6.0.3		FREE
PROGRAPH	2.5	2MB/6.0		$49.99
PROPSFORMS	2.0	1MB/6.0.3		FREE
PROTOTYPER	3.0	1MB/4.1		$99
PUBLISH IT	1.2	512KE/5.0		*
PUBLISH IT EASY	2.0	1MB/6.0		*
PYRO	4.0	512K/4.1		$15

PRODUCT	V.	REQ.	★	S
QUARKXPRESS	3.1	2MB/6.0.5		*
QUICKDEX II	1.4D	1MB/6.0.5		*
QUICKEN	3.0	1MB/6.0.5	12/91	*
QUICKEYS'	2.1	1MB/6.0.2		*
QUICKLETTER	1.1.5	1MB/6.0		$25
QUICKMAIL	2.5	512KE/3.2		*
QUICKSHARE	2.0	512KE/3.2		*
QUICKSHOT	2.1	1MB/4.2		$5
RAGTIME 3	3.1	2MB/6.0		$150
READ-IT OCR PERSONAL	2.1	1MB/6.0.3		$29
READ-IT OCR PROFESSIONAL	3.0	2MB/6.0.3		*
READYSETGO	4.5	1MB/6.0		*
RETROSPECT REMOTE	1.3	1MB/6.0		*
RIGHTWRITER	3.1	512K/3.0		$29.90
RUNPC	3.1.2	512K/6.0.4		NA
SAM	3.0	1MB/6.0	2/91	$29
SCHEDULEMAKER	3.01	1MB/6.0		$25
SCULPT 3D	2.0.6	8MB/6.0.5		FREE
SCULPT 4D	2.0	8MB/6.0.5		$1000
SHADOWWRITER	1.1	2MB/6.0.2		FREE
SMALL BUSINESS ACCOUNTING SYSTEM	2.1	512K/4.1		FREE
SMART ALARMS	3.07	1MB/6.0.2	11/91	$40

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Circle 313 on reader service card

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SMARTFORM DESIGNER	1.1	1MB/6.0		FREE
SMARTSCRAP & THE CLIPPER	2.01	1MB/6.0.3		*
SNAP	3.1.3	1MB/3.0		*
SOUND DESIGNER II	2.01	2MB/6.0.5		*
SPELLING COACH PROFESSIONAL	3.1	512KE/4.2		*
SPELLSWELL	2.2	512K/3.2		$20
SPINNAKER PLUS	2.0	2MB/6.0		$45
STATUS MAC	2.0	1MB/6.0		*
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STRATAVISION 3D	2.0	2MB/6.0.3		$99
STUDIO/8	2.0	2MB/6.0.5	6/91	$30
STUDIO/32	1.1	5MB/6.0.5	4/91	FREE
STUFFIT CLASSIC	1.6	1MB/6.0		*
STUFFIT DELUXE	2.0	1MB/6.0	7/91	FREE
SUITCASE II	2.0	512K/4.1		$25
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SUPERANOVA	1.1	1MB/6.0.2		FREE
SUPERCARD	1.5	1MB/6.0.5		$55
SUPERGLUE II WITH GLUENOTES	2.1	1MB/6.0		*

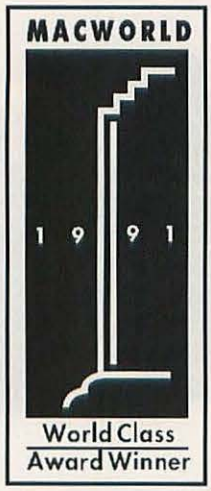
PRODUCT	V.	REQ.	★	S
SUPERLASERSPOOL	2.0.2	1MB/6.0		$30
SUPERSPOOL	5.0	512K/4.1		$30
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SYSTAT	5.1	2MB/6.0		*
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TASTE	1.01A	2MB/6.0.2		FREE
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TEXTPERT	3.01	1MB/6.0		FREE
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THEORIST	1.1	1MB/6.0		*
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THINK PASCAL	4.0	1MB/6.0		$69
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TIMESLIPS III	2.0	1MB/6.0.2		*
TOPDOWN	3.0	1MB/6.0.4	10/91	*
TOPSCAN PLUS	1.0	2MB/6.0.5		NA
TOUCHBASE	2.0	1MB/6.0.5	9/91	*
TRAPEZE	2.1	1MB/6.0.2		FREE
TRUEFORM	2.1	1MB/6.0		FREE
TSCRIPT	3.0	1MB/6.0		$60

PRODUCT	V.	REQ.	★	S
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TYPEREUNION	1.01	1MB/6.0		FREE
TYPESTYLER	2.0	2MB/4.0		$25
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VIRTUAL 2.0 FOR 030	2.04	1MB/4.2		FREE
VIRTUAL 2.0 FOR MAC II	2.04	1MB/4.2		FREE
VIRTUAL 2.0 FOR MAC PLUS	2.04	1MB/4.2		FREE
VISION	1.32	2MB/6.0.3		$29
WHITE KNIGHT II	1.12	1MB/6.0.2		*
WILLMAKER	4.0	512KE/4.2	3/91	$16.50
WINGZ	1.1	1MB/6.0		FREE
WORD FINDER	2.0	512K/3.2		*
WORDPERFECT FOR THE MACINTOSH	2.0.3	1MB/6.0.3	7/91	$89
WORDPERFECT OFFICE	3.01	1MB/6.0.5	12/91	NA
WORKSPLUS SPELL	2.0	1MB/6.0.3		$35
WRITENOW	2.2	512K/4.2		$49

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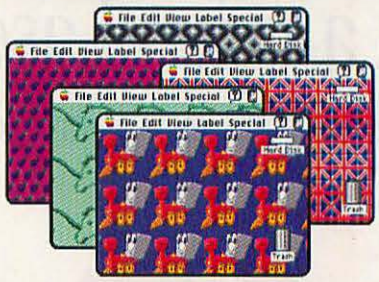
Because StatView combines powerful statistics with a remarkably easy-to-use interface. And StatView is the only statistics package with fully-integrated presentation graphing, enabling you to analyze data and present your results all in one program.

If you analyze data with a Macintosh, you should be using the best — StatView.

To find out more about StatView, call **1-800-848-6651, ext. 231.**

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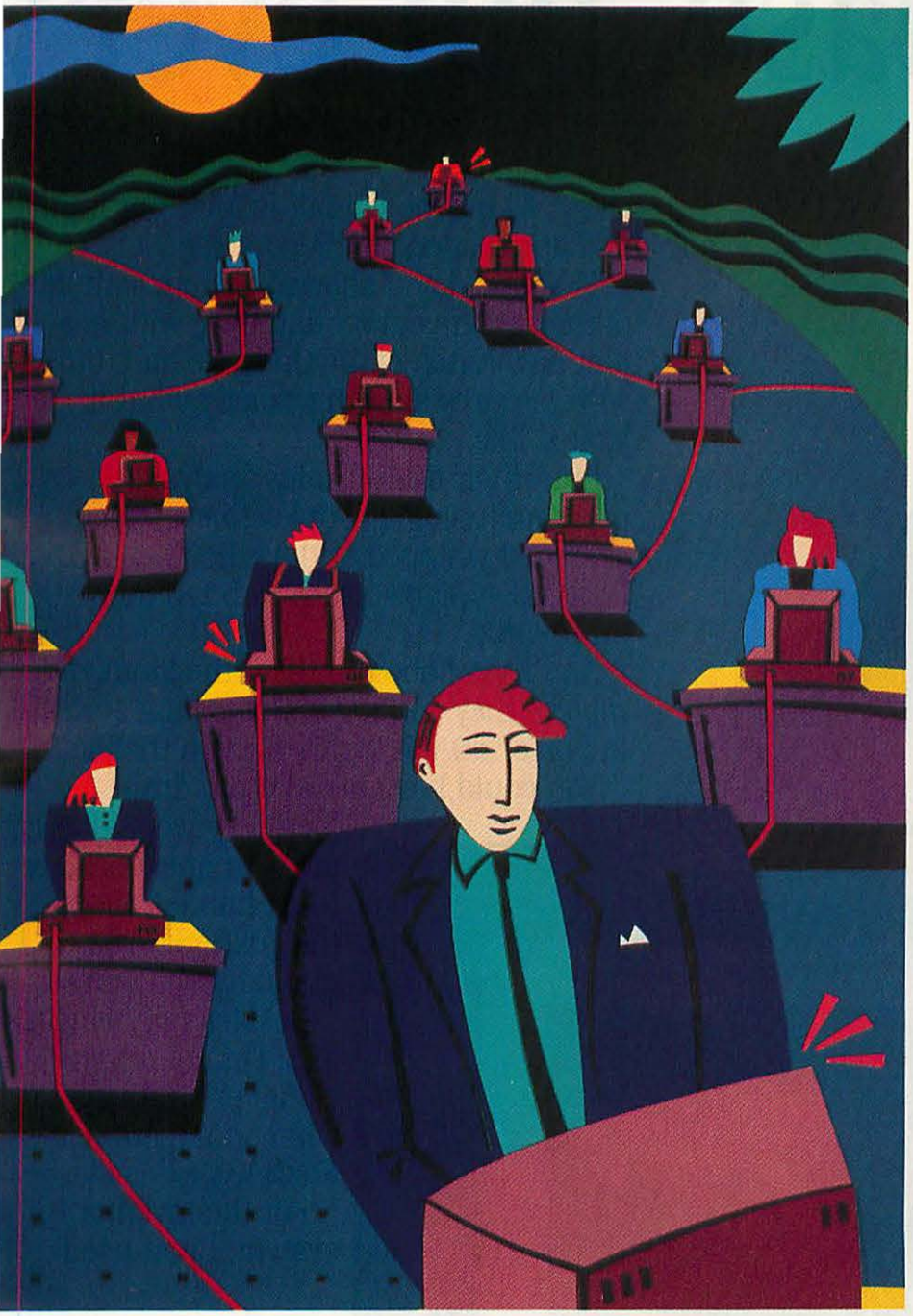
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They laughed when database, but every



Okay, so maybe I'm not in MIS, but I grinned and loaded FoxBASE+/Mac.

The next day, I showed them a sample of their PC inventory database with not just how much of anything we had, but with pictures showing exactly what it looked like.

I ran their dBASE sales analysis program (using a couple of new Mac screens I whipped out) as they watched FoxBASE+/Mac scream through the numbers.

And then I showed them the kinds of reports they could get, using data stored in Fox or dBASE IV/III+ files on the PC.

You could have heard a pin drop.

Then they were all over me with questions, so I just handed them the FoxBASE+/Mac manuals and smiled.

Besides not being in MIS, I'm not a professional programmer, so you can tell how easy FoxBASE+/Mac is.

For the inventory system, I just used



I brought in my own one's smiling now.

FoxBASE+/Mac to read the database files they had on the PC (it reads Fox and dBASE IV/III+ files directly). I added a memo field into which I cut and pasted pictures that our DTP department had for our customer literature. Then I used the MacDraw-like screen painter to create a great color Mac output screen.

The sales analysis was easy, too. I had to create new screens but FoxBASE+/Mac ran the rest of the dBASE III+ program just fine. (It typically runs as much as 95% of standard FoxBASE+/PC and dBASE III+ code with no changes.)

And I built the reports I showed them from scratch. With no programming at all.

If you're looking for a better way to manage your data, call Fox Software and ask for their free demo. It limits the number of records you can store, but is the full program, so you can check it all out for yourself on your applications.

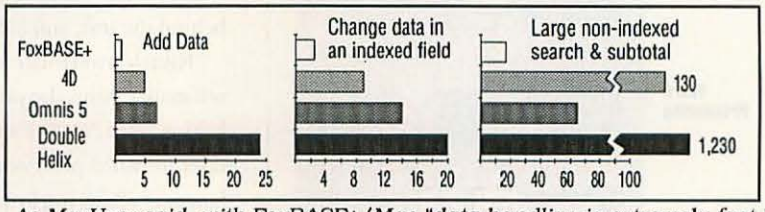
Around here, MIS has been pretty busy the last few weeks. They've hooked up Macs and PCs on an Ethernet network and our information and data processing systems are looking great.

They're building Hypercard-like applications I see people using all over the place.

Accounting likes all of this because the single-user version lists for $495, and the unlimited Multi-User version is only $695.

And even the PC programmers are happy. I hear them talking about things like the great trace and debugging facilities, adding XCMDs and XFCNs, the dBASE-like programming language, System 7 compatibility, full file and record locking in the multi-user version, and how FoxBASE+/Mac is "so astoundingly fast for a Mac."

Everyone seems to be laughing more now, too.



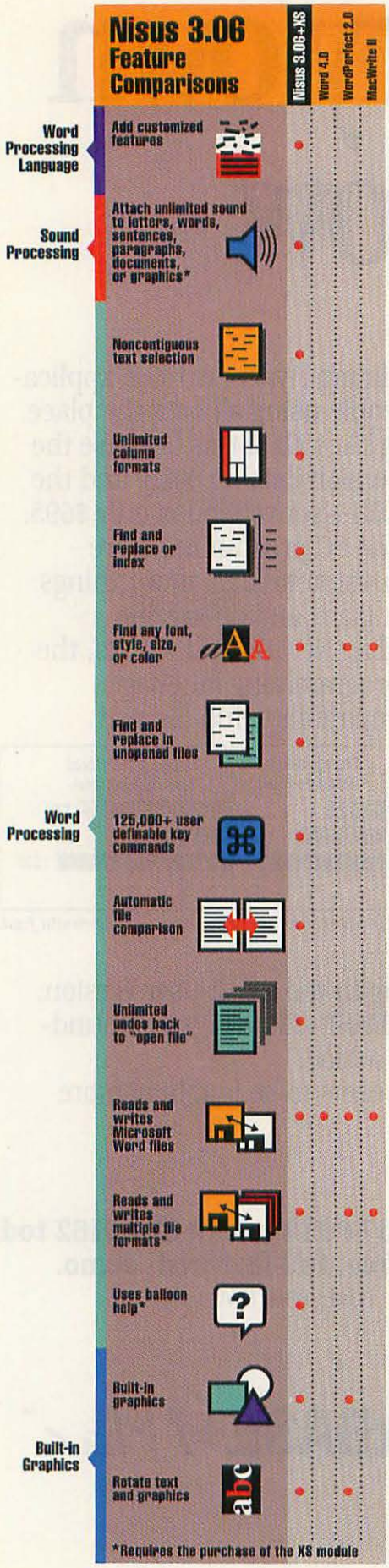
As MacUser said, with FoxBASE+/Mac "data handling is extremely fast."

Call 1-800-837-FOX2 or 419-874-0162 today for a free, full-featured demo.

(Ask for Offer MWD-1101)

FoxBASE+/Mac™

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★★★★1/2, MacUser Magazine /System 7 Compatible

Nisus® is the only word processor that can reformat a mainframe file, illustrate a medical procedure, and even help you learn to read, write, and speak a foreign language.

Nisus' built-in word processing language manipulates words like databases manage data, so mainframe file conversions are easy. Nisus lets you communicate the way the Macintosh works—with words, graphics, and sound.

Word Processing. If you want a word processor that is as easy to use as MacWrite II but more powerful than Microsoft Word 4.0, buy Nisus. All word processors have "find and replace." Nisus lets you find any word you want to change, (even words with a special *font*, size, *style*, or color)—even in unopened files—and then replace or *index* your changes. You can select noncontiguous words or use the unlimited undo all the way back to when you opened the file.

Graphics. Sometimes, something as simple as a note with an arrow attached is all you need to make your point. You can "Place" any page of a Nisus file containing text and graphics into another Nisus file where it becomes a graphic. Double clicking "Placed Page Graphic" will open the original file for editing. Graphics can be drawn or pasted to three different layers: the text layer, behind the text, and in front of the text.

This is an example of how to draw attention to something in a document.

Nisus lets you rotate text, which is important if you are designing a two-fold three-panel self-mailer. Nisus also prints pages in pamphlet style with correct pagination for assembly.

Built-in Word Processing Language. Nisus has a built-in word processing language which does for word processing what built-in languages do for databases. For example, the language allows you to develop commands to index all proper names, find and correct all double words, periods, and extra spaces, or to index every word in a document except those you specifically want to exclude. You design features just right for you.

Sound Processing in Nisus XS. The way people communicate most often is with the sound of their voice. Now you can do just that with our new module *Nisus XS*. Attach sound to a character, word, sentence, paragraph, or document. You can even attach it to a graphic. Imagine being able to teach the *sound* of a foreign language, hearing the pronunciation of technical terms, or simply attaching sound to text to teach reading.

Nisus XS takes advantage of Balloon Help, the Publish & Subscribe features of System 7, and for interapplication communication Nisus has implemented Apple Events.

Discover why the world writes with Nisus. Find out why *MacUser* gave Nisus ★★★★1/2, *Byte* Magazine gave Nisus its 1990 Award of Merit, *MacUser U.K.* named Nisus "1989 Best Word Processor," Nisus is shipped with every Macintosh in Korea, and *Macworld Australia* has standardized on Nisus. Note also that Nisus is available in Hebrew, Japanese, and Arabic versions. **Call and ask for our free brochure, "How Nisus compares with other word processors." And visit us on CompuServe at our new Paragon Forum. We can't promise sound on CompuServe, but once you use Nisus, you'll know you made a sound decision.**

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Circle 253 on reader service card

MACWORLD NEWS

by Dan Littman and Tom Moran

RasterOps to Offer Color Printer, CMYK Conversion

Expanding its color-calibrated solutions for graphics professionals, RasterOps has designed its first printer of any kind. The 24-bit CorrectPrint 300 is a photo-realistic color printer with a dye-sublimation print engine that produces continuous tones at 300 dots per inch.

RasterOps decided to introduce a color printer to help close the feedback loop for graphic artists and desktop publishers who need to calibrate color monitors and printers to the same standard so that the hard-copy output more closely matches what's displayed on the monitor's screen. The CorrectPrint 300 printer is compatible with the existing RasterOps CorrectColor Calibrator optical measuring system.

RasterOps also announced a CMYK-to-RGB conversion chip that operates at 100MIPS and that the company will include in a variety of future graphics products designed for faster color matching and high-end image manipulation.

The CorrectPrint 300 printer comes with 35 resident fonts, and its PostScript-compatible controller includes a RISC-based microprocessor chip for faster processing. The CorrectPrint 300 also has an AppleTalk connector, an EtherTalk port, SCSI connectors, and a serial port. The printer can handle letter, legal, A4, and A4 special-size paper.

Scheduled to ship in January, the CorrectPrint 300 will carry a list price of $10,999. For more information, contact RasterOps in Santa Clara, California, at 408/562-4200.—T.M.



ROBERT PERRY

The RasterOps CorrectPrint 300 is a 24-bit dye-sublimation printer that produces photo-realistic images. The printer also works with the RasterOps CorrectColor Calibrator.

Cloning The Mac

The race to clone the Mac is leaping ahead with the development of technology that runs Macintosh software on a Next machine.

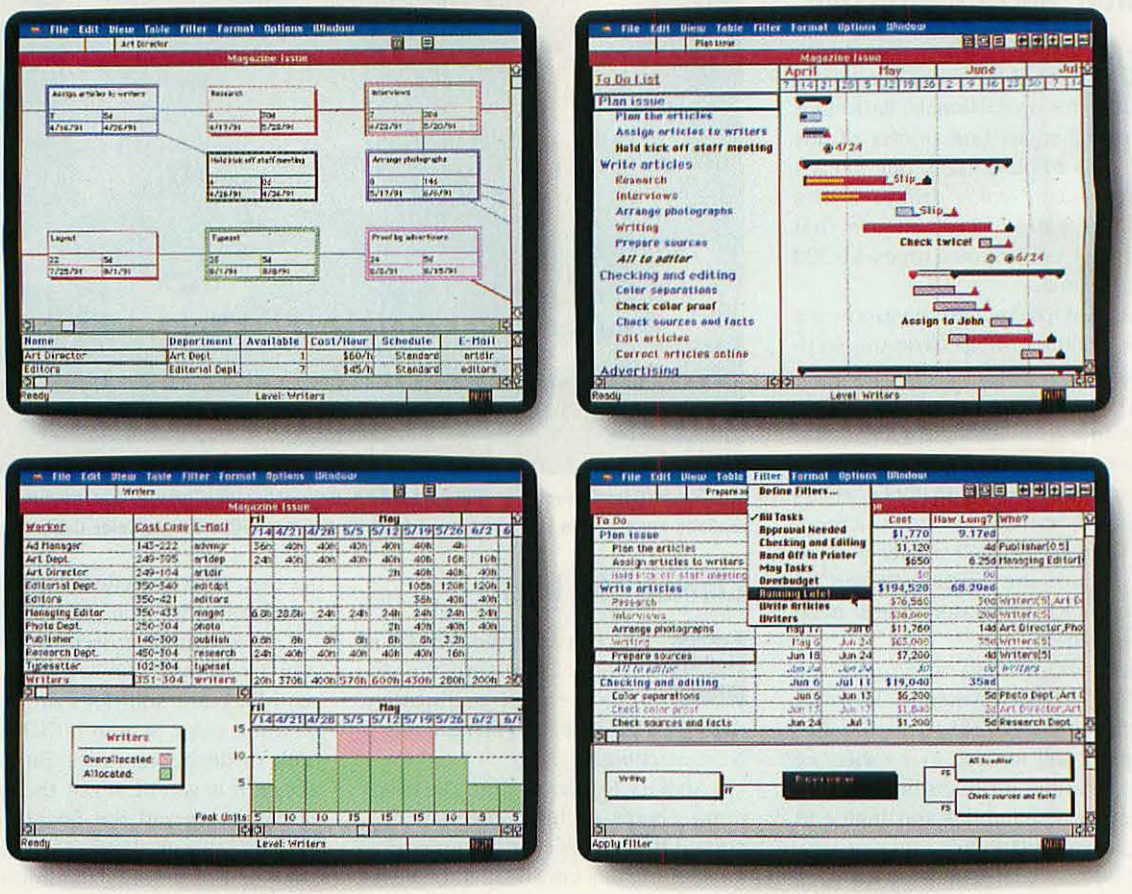
Abacus Research and Development claims to have reverse-engineered the Mac ROM, which contains most of the Macintosh Operating System, and expects to ship code this winter that emulates the Mac OS on 680X0-based Unix machines, including the Next and some Sun workstations. Abacus will guarantee that the emulation software, called Executor, will run Microsoft Word perfectly. Company president Cliff Matthews says he has other popular programs running now; his goal is to develop a version of Executor that runs all Mac applications, and then to persuade hardware companies to use it as the basis of clones. The code is portable so that, in conjunction with a 680X0 emulator, it will run on other CPUs.

An operating system does not a Mac clone make, however: Matthews says Executor still does not support printing, color, System 7, INITs, AppleTalk, or desk accessories. But his first concern is getting it out the door to attract users and the financial community. Abacus developed Executor by clean-room-only techniques, so Matthews is confident about his company's legal position. Still, the threat that Apple might sue anyway could scare off allies, and Abacus, unlike another clone developer called NuTek Computers (see "Send In the Clones," *Macworld,* April 1991), isn't well financed enough to indemnify interested developers.

The Word-only version of Executor will ship for $80 when Abacus gets printing to work (the company may ship it before printing is available and

(continues)

Before you start your next project, check your options.



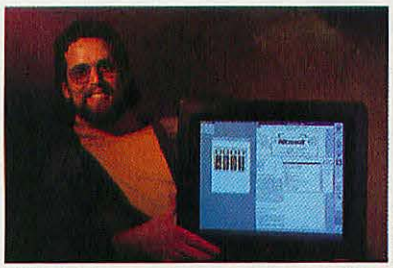
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MICHAEL BARLEY

Cliff Matthews. Abacus Research and Development has enough of the Mac OS cloned to run Microsoft Word on a Next machine.

offer a free upgrade instead). The complete emulation will cost $700. Abacus is in Albuquerque, New Mexico, at 505/766-9115.—**D.L.**

Telebit's 38,400-bps Portable Modem

QBlazer from Telebit Corporation is the fastest portable modem to date, with a maximum data-transfer rate of 38,400 bps. The device, intended for use with Apple's PowerBooks and other portable computers, is roughly a cube measuring less than 2½ inches per edge and weighing only 8 ounces.

The modem offers a variety of error control, compression, and other communications modes including V.32, V.22 bis, V.22/212, V.21/103, V.42, V.42 bis, and MNP Class 5. The QBlazer is compatible with the Hayes AT command set.

The QBlazer includes eight LED status lights, a speaker, a carrying pouch, an AC adapter, and cables. The modem runs for about two hours at full load on a 9V alkaline battery.

Telebit began shipping the modem in early October at a list price of $745. Telebit is in Sunnyvale, California, at 408/734-4333.—**T.M.**



STEVEN BARATZ

The QBlazer modem from Telebit has a maximum data-transfer rate of 38,400 bps and weighs only about 8 ounces.

Online Aesthetics

Dave Hughes is a hacker-poet who has spent ten years frustrated that he can't merge poetry with art—and transmit it at 1200 bps. He may soon get some satisfaction. Hughes, after advocating widespread adoption of a videotext standard called NAPLPS (North American Presentation Level Protocol Syntax), has finally convinced several companies to market commercial NAPLPS software for creating interactive, graphics-based, online services.

The NAPLPS standard has been around for a while, but mostly in one-way systems like kiosks and commercial online networks such as Prodigy. Hughes wants online systems that allow users to create and send images that are displayed as part of the process of communication. NAPLPS graphics transfer quickly because the protocol works by sending instructions describing the image—put a rectangle here, make it 5 inches by 8 inches, color it red—that are executed on the receiving end. Images can include foreign fonts and pictograms. Hughes says that Native Americans in Montana run a thriving electronic bulletin depicting Native American history with traditional symbols. Others are using NAPLPS to teach



DAN CALDWELL

Dave Hughes, self-described poet laureate of the network nation, logs on to the grid from Roger's Bar in Colorado Springs.

math to students in remote areas. And the same capability could support online chess games. Image quality is not the greatest, but it beats the text-only interface that drives online habitués to tricks like the sideways smiley face ": —)".

MacGregor Software in Saint Laurent, Quebec, plans to publish a series of Mac NAPLPS products, including a terminal package with Xmodem and Zmodem support, a two-way package, and later, a host-development system. MacGregor is at 514/273-3801.—**D.L.**

GCC Offers Faster BLP Elite

GCC Technologies has begun shipping an 8-pages-per-minute version of its existing 4-ppm BLP Elite printer. The 8-ppm version lists for $2099, versus $1599 for the 4-ppm device. Both printers are PostScript devices.

GCC has also begun offering a $799 board that upgrades the company's PLP IIS, a QuickDraw printer, to PostScript.

For more information, contact GCC in Waltham, Massachusetts, at 617/890-0880.—**T.M.**



Blasting a 13-inch mortar. This Civil War illustration and several hundred others like it are reproduced on a CD ROM.

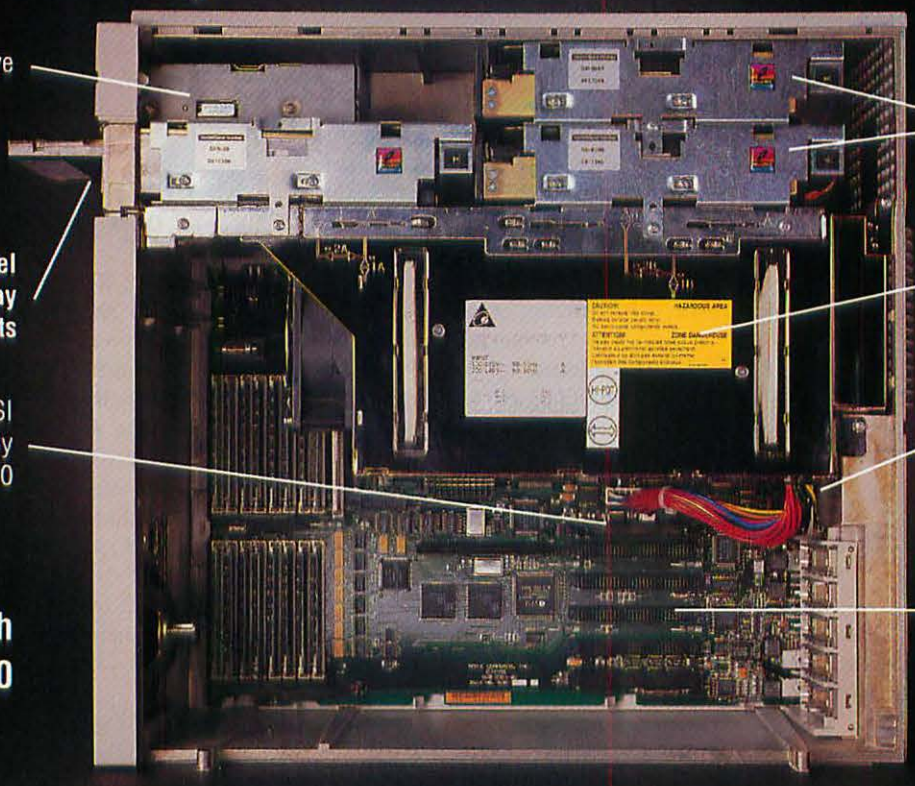
The Civil War on CD ROM

A rare book of illustrations drawn during the Civil War has been resurrected as a CD ROM. The disc preserves approximately 750 black-and-white illustrations from Frank Leslie's 1895 collection of wartime art called *The Illustrated Civil War.*

The drawings show land, sea, and river battles; military camps; social conditions; military and political leaders; small-town life; and civilians—with even a few handbills thrown in. It has three levels of zooming to reveal fine detail. Every screen has a map indicating where the event depicted took place; and most have military music, cannon and gunfire,

(continues)

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MicroNet's RAVEN brought unbeatable disk array performance to the Macintosh II. Now there's a more powerful Macintosh. The Quadra 900! It's based on 68040 technology and it's fast. The performance of the Quadra can be greatly increased by use of a MicroNet RAVEN·040 disk array.

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The RAVEN·040 is expressly designed to use the built-in SCSI-2 ports of the Quadra 900. The PDS and all five NuBus slots remain open for other use.

The RAVEN·040's built-in performance makes it ideal for graphics, animation, pre-press, digital sound, multimedia, CAD/CAM, and file-servers, where speed and capacity are paramount.

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heavy weather, or other sounds that were most likely not available with the 1895 edition. Leslie was a Yankee, and the CD reproduces several hundred pages of history he wrote for the book that reveals his slant. The Illustrated Civil War lacks hypertext navigation and other newfangled gimmickry that a CD might have, but it is an excellent reproduction of a rare and interesting book.

The Illustrated Civil War lists for $99.95. For more information, write IT Makers, P.O. Box 730152, San Jose, CA 95173.—**D.L.**

Timbuktu/Remote Adds Color

Timbuktu/Remote, the popular screen-sharing telecommunications software from Farallon Computing, now supports the transfer of color screens and is compatible with System 7. Like previous versions, Timbuktu/Remote 3.0 lets one Macintosh user access another Mac via a modem and manipulate that Mac as a separate desktop inside a window, either for collaborative work or for greater access to information across an enterprise.

The new version of the software supports autoscrolling, which makes it easier to view an entire remote screen even on a small monitor. Farallon has also simplified the password scheme for easier access to different Macs on a network.

At least two copies of Timbuktu/Remote 3.0 are needed. The list price for a single-user copy is $195; Farallon offers discounts for multiple copies. Registered users of Timbuktu/Remote 2.0 can upgrade to 3.0 for $35 per user, unless the product was purchased after August 5, 1991, in which case a free upgrade can be obtained by calling Farallon.

The product is also available as part of Farallon's $1295 Timbuktu/Remote Access Pack, which includes a 9600-bps modem with V.32 and V.42 bis capability, and a Remote/Wakeup cable, which can turn on the Mac when the modem receives a call. For more information, contact Farallon Computing in Emeryville, California, at 510/596-9000.—**T.M.**



JOHN WILLIAM LUND

The VDeck Hi8 from Sony is an 8mm VCR that can be controlled by the Mac for video editing on the Mac.

Sony VCR Works with Mac

Sony will begin shipping in December the VDeck Hi8, an 8mm VCR controllable by the Mac and designed to add full-motion video. The device reads and writes RC Time Code for frame-accurate searching for faster, more accurate video editing.

The VDeck Hi8 also lets the Mac control and select from up to three video and three audio sources, with digital overlay of audio. The unit includes VISCA (Video System Control Architecture), a Sony-designed protocol for controlling up to seven compatible video devices.

The VDeck Hi8's list price was not set at press time, but the VCR was expected to cost less than $2500. For more information, contact Sony at 201/930-6432.—**T.M.**

Big Office

A new integrated suite of groupware applications called Professional Assistant is designed to manage the day-to-day routine of office life. The program has four modules: DayBook, a multiuser calendar and to-do list; DataCard, a structured multiuser database for information about companies, contacts, and personnel; LetterFile, for creating and using letter templates and boilerplate; and Documents, a document-management system.

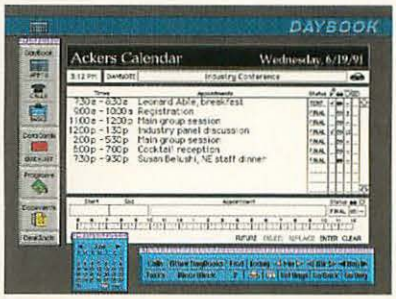
DayBook's calendar provides alarms and prints day, week, and month views to fit most date books. You can schedule events on a Portable while traveling, and later upload changes to the central calendar; the program then asks the traveler to resolve any schedule conflicts that arise.

The calendar and to-do list can be linked to DataCard records so that the phone number will be waiting for you in a reminder to call someone. DataCard can also maintain repeating dates and pop a reminder into your calendar.

LetterFile has a word processor with a spelling checker and a design mode for laying out such things as letters with letterhead. LetterFile fills in the address from DataCard, but the first version does not support mail merge. Templates and boilerplate can be stored three ways: for yourself, for a workgroup, or for everyone on a network.

The Documents module is for storing and distributing files created in any application and, like LetterFile, uses a three-tier system.

Professional Assistant runs on any AFP-compliant network including AppleShare and Novell. The server software and a ten-user pack costs $2500; larger quantities cost less per unit. For more information, contact MediaWorks in Los Gatos, California, at 408/356-0620.—**D.L.**



A busy day ahead for a Professional Assistant user. The button panel at left leads to other parts of the package.

New Thoughts

ThoughtPattern, the Mac's first serious personal information manager, stores all kinds of information in an unstructured database. Anything you do not want to put into ThoughtPattern itself, such as color images, you can link to a ThoughtPattern database and view from within the program. In the next release, version 2.0, you

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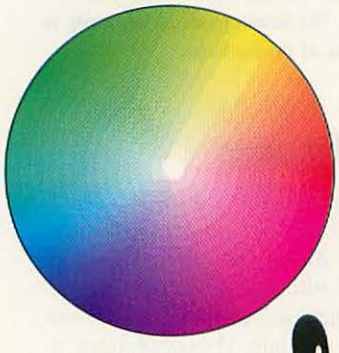
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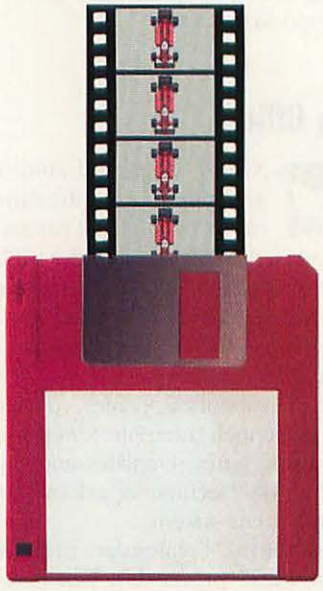




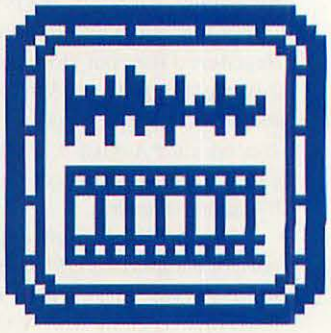
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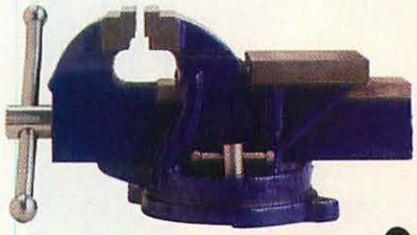
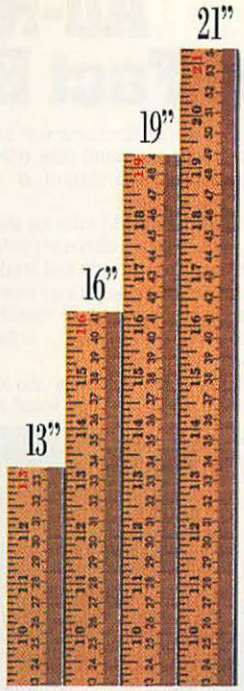


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TigerSoftware brings you another new way to use your Mac. This product, a brand new release, puts a library of valuable information at your fingertips.

The Software Toolworks World Atlas for Macintosh is the perfect single-source reference guide for travelers, educators, business people and students of all ages. This indispensable tool brings together important information that would take months to research on your own: government, inflation rates, climate, economy and more!

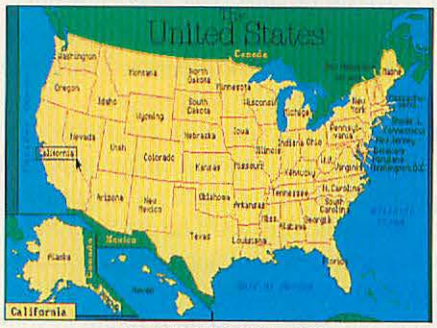
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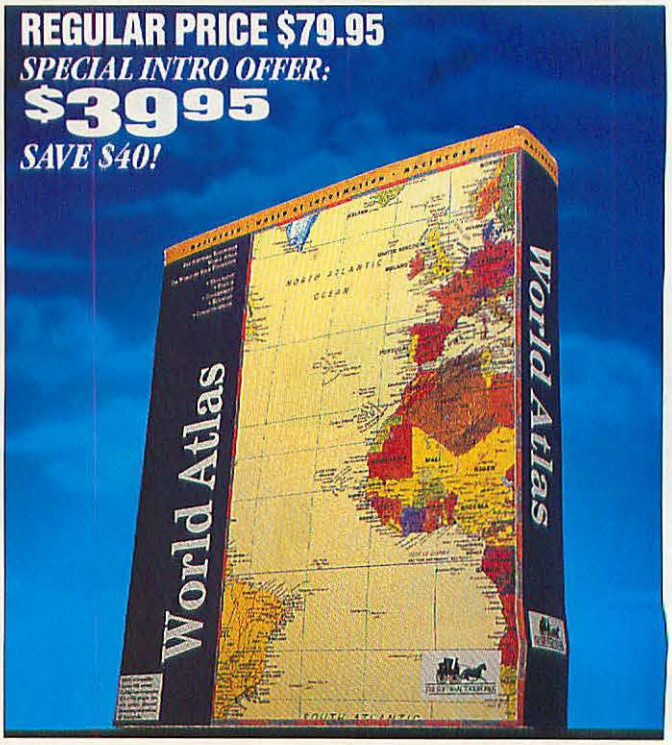


Vibrant maps with a mouse-click.

An Alarming Statistic...

I recently read that the majority of high school students don't know where their state is located. They know what their state looks like (from seeing it on television weather maps, no doubt), but don't know what other states border it. That's pretty sad. The United States is one of the most diverse, beautiful countries in the world. With World Atlas, students of all ages can gain an understanding of their homeland, and gain a view of the entire globe.

Once a student understands the geography of a region of the world, it becomes much easier to grasp the politics that exists there. Click on Iraq and learn how the Gulf War of early 1991 dramatically changed the relationship of the countries of the region. Learn how the ports and highways played such an important role in the flight of the refugees from Baghdad, why the Iraqi airfields were such an important target for the Allied air forces, and how Iraq's terrain contributed to the military effort.



A Wealth Of Knowledge...

Click to Japan and learn about its climate, its environmental problems and its highways and railroads. Click to Switzerland and discover facts about its economy; its inflation rate and monetary conversion rates. Discover how this small nation supplies electricity to its people, and its ethnic divisions. Click to Greenland and explore one of the world's most mysterious countries: explore its fishing industry, its other major industries and surprising facts about its climate, religions and telecommunications.

On to South America: Click to Chile and discover how its government operates, and why it is one of the most geographically unusual countries in the world. You'll be able to answer any question about any nation on the planet. Which country has the highest infant mortality rate? Which country has the highest Gross National Product? Which country has the most national holidays? Which country has the highest literacy rate? Which country has the most sophisticated highway system? Which country has the most coastline?

A Sample of Information In World Atlas

The text includes detailed information on the following topics:

Geography — *12 topics including:* Total Area, Comparative Area, Land Boundaries, Coastline, Terrain, Land Use, Environment and Climate.

People — *28 topics including:* Population, Nationality, Religions, Ethnic Divisions, Language, Infant Mortality Rate, Life Expectancy, Literacy and Labor Force.

Education — *11 topics including:* Literacy, Educational Expenditures, Newspapers and Libraries.

Health — *21 topics including:* Access to Health Care, Calorie Consumption, Medical Personnel and Mortality Rate.

Government — *22 topics including:* Official Name, Type, Capital, Administrative Divisions, Government Leaders, Military Budget, Legal System, National Holidays, Elections and Military.

Crime — *10 topics including:* Murder, Theft, Serious Assault and Drug Offenses.

Economy — *55 topics including:* GDP/GNP, Exchange and Inflation Rates, Natural Resources, Agriculture, Fishing, Major Industries, Electricity, Exports and Imports, Mining and Manufacturing, Energy.

Agriculture — *62 topics including:* Work Force, Animals, Animal Products and Land Allocation.



All data from world organizations and U.S. government sources.

Communication — *20 topics including:* Railroads, Highways, Inland Waterways, Pipelines, Ports, Civil Aircraft, Airfields, Telecommunications and Television.

Travel — *10 topics including:* Required Documents, Commerce, Local Time, Tourism.

Quick, Easy and Fun to Use!

World Atlas is simple to use. There are no commands to learn; just point to a country on any index map, click, and the desired map appears — instantly! Specific information for individual countries and statistical maps are easy to select from drop-down menus. You can even print customized reports of maps and data. Plus, both map and text fields can be exported for use in desktop publishing.

THE SOFTWARE TOOLWORKS

WORLD ATLAS

BZ2225 **World Atlas** Macintosh **$39.95**

Macintosh Plus, SE, SE/30, Classic, LC or II series. Requires System 6.02 or higher, 7 MB hard disk, B&W or color.

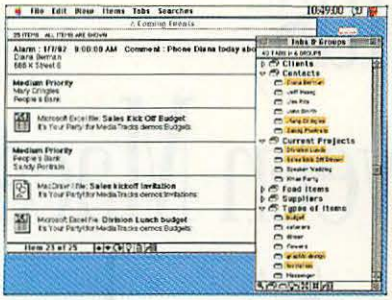
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ThoughtPattern notes and links to external files. The front window shows version 2.0's new hierarchical tab groups.

will be able to mix the old-style unstructured records with records that have fields like a normal database's, and you will be able to select fields to print. Layouts are preconfigured, and there are no tools for creating new ones, but a later version will provide a layout editor.

Version 2.0 will implement Claris's XTND file-viewing technology, support voice notes, and support attaching text notes to linked external files. ThoughtPattern will also support Boolean searches for two text strings, import QuickDex files directly, and will be able to shrink open files down to an icon on the desktop.

ThoughtPattern lists for $149.95. Bananafish Software is in San Francisco at 415/929-8135.—**D.L.**

The Talking Linguist

Emerson & Stern Associates, which develops voice- and language-related software, is singing a new tune with Sound Bytes, a voice-synthesis engine that, unlike the venerable MacinTalk created at Apple and popularized in the Talking Moose desk accessory, sounds like a person speaking instead of a comical space alien.

Voice synthesis is the process of converting written text into spoken words. Sound Bytes will come with a 50,000-word dictionary and provide a way to add new words (adding them will require some familiarity with phonetic spelling). The Sound Bytes engine has a parser, which understands sentences and distinguishes between such pronunciations as "He won the contest" and "He contested the verdict."

Sound Bytes isn't perfect, at least not in beta form. Sentences clatter a bit, and sounds sometimes seem to overlap slightly. But it sounds like English and would be easily understood over the telephone.

Emerson & Stern will license the Sound Bytes code to developers, starting at $9400. The company is in San Diego at 619/457-2526. The first Sound Bytes–based application announced is a new version of Interactive Learning Materials' Write This Way, a word processor for the learning-disabled that lists for $195. Interactive Learning Materials is in New York at 914/232-4682.—**D.L.**



ROCKY THIES

At San Diego's Angier Elementary, teacher Nancy Harris uses Write This Way with Evan Floyd and April Cates.

900MB Drive Fits inside the Mac

Microtech International has introduced the Nova N900i, a 911MB 3.5-inch hard drive that fits inside all Macs that have an internal drive bay. Intended for folks who need a lot of storage, the N900i has an average access time of 12.5ms and a data-transfer rate of up to 10MB per second.

Two of the drives can be used inside a Mac II, IIx, or IIfx. The N900i lists for $4599 and is currently shipping. For more information, contact Microtech in East Haven, Connecticut, at 800/626-4276.—**T.M.**

A Well-Organized Plot

Jandel Scientific is the leading vendor of scientific graphing software, with more than 25,000 user sites worldwide. For years, Macintosh-using scientists have seen Jandel's SigmaPlot advertised in technical journals and looked in vain for the magic words you are about to read. "SigmaPlot for the Macintosh is now available."

SigmaPlot includes a huge array of scientific graphing features, including eight axis scales, a mathematical transform language, and a nonlinear curve fitter. The program quite pointedly excludes some chart types that are familiar to business users, such as 3-D bar charts. "We [believe] that charts with varying perspective and shading are often misleading and aren't appropriate for quantitative data display," says Jandel president Joe Osborne.

SigmaPlot supports entering data from standard sources (including text files and Microsoft Excel) as well as entering data directly into a 32,000-row-by-16,000-column worksheet, and provides layout controls for graphic elements and text that are comparable to a page-layout application. Graph files and data files can be exchanged with the DOS version.

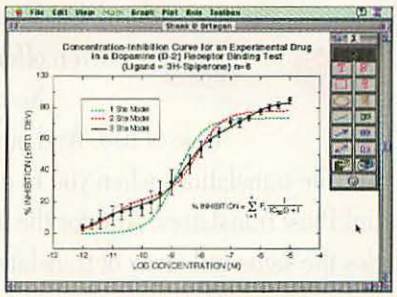
SigmaPlot lists for $395. Jandel Scientific is in Corte Madera, California, at 415/924-8640.—**Charles Seiter**

NetWare's Printing, Routing Improve

Novell has released NetWare for Macintosh 3.01, which adds improved Macintosh printing and AppleTalk routing capabilities to the extremely popular network operating system designed for mixed environments.

Macintosh users can now manipulate their own print files through a supplied desk accessory after the

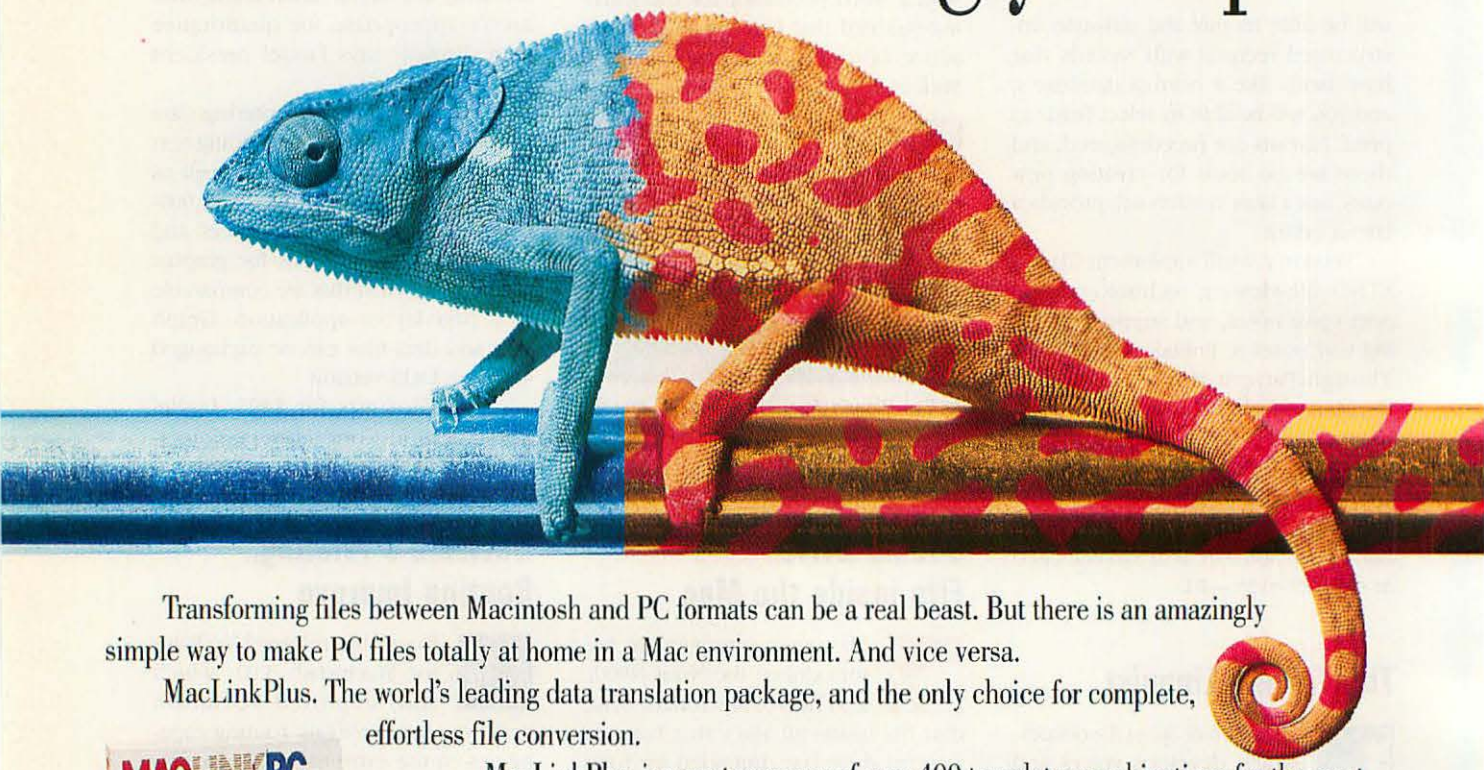
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RICHARD SHANK

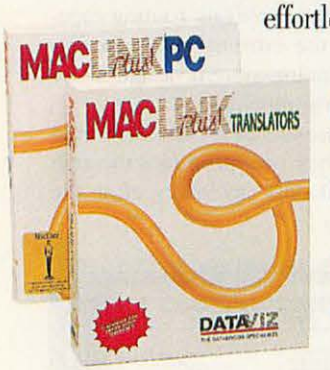
Three curves generated by SigmaPlot as part of an analysis of the neural-binding characteristics of an experimental drug.

With MacLinkPlus, Transforming Files Between Macs And PCs Is Amazingly Simple.



Transforming files between Macintosh and PC formats can be a real beast. But there is an amazingly simple way to make PC files totally at home in a Mac environment. And vice versa.

MacLinkPlus. The world's leading data translation package, and the only choice for complete, effortless file conversion.



MacLinkPlus is a vast resource of over 400 translator combinations for the most popular programs running under Macintosh, MS-DOS or Windows. Including Microsoft Word, WordPerfect, Excel, Ami Professional, MultiMate and dozens of other word processing, spreadsheet, database and graphics applications.

File translations are automatic with "point-and-click" simplicity, and we include DOS Mounter software so MS-DOS disks show up right on your Macintosh desktop. We even offer complete compatibility with XTND file conversion.

No matter what version of System you're running, MacLinkPlus sets the standard in ease of use. And our new version 6.0 is packed with features that exploit System 7 innovations.

For file translations when you're connected via a network, file server, or SuperDrive, all you need is MacLinkPlus/Translators. And for the added capability of file transfer using a cable or modem, MacLinkPlus/PC includes the same full array of translators as well as a serial cable and communications software.

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VIRUS WATCH

Current viruses, Trojan horses, and worms affecting the Macintosh community.

ZUC C

Type: Virus
First listed in Virus Watch: 10/91
Info: A ZUC clone.
Impact: Nondestructive; infects applications and system files; renders cursor inoperable.

HC

Type: Data Virus
First listed in Virus Watch: 6/91
Info: Infects HyperCard stacks.
Impact: Causes the Mac to hum oddly.

nCAM

Type: Virus
First listed in Virus Watch: 5/91
Info: An nVIR clone.
Impact: Nondestructive; infects applications and system files; can cause crashes.

files have been queued to a NetWare Print Server or NetWare 3.11 server. Previously only the system administrator could change the order of, delay, or delete files in the queue. Administrators of large networks can now assign print queues to specific network zones.

The AppleTalk router that comes with Netware for Macintosh 3.01 has improved autoconfiguration capability. The router can also send AppleTalk data over Arcnet, Ethernet, LocalTalk, and token ring cabling.

NetWare for Macintosh was slated to ship on November 7. The suggested retail price for a 20-user package is $895; a 100-user package is $1995. For more information, contact Novell in Provo, Utah, at 801/429-5900.—**T.M.**

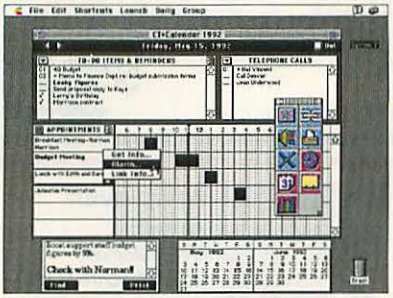
The HyperCard Secretary



Danny Goodman is back with Connections, a HyperCard-based personal information manager and workgroup calendar. Connections has three pieces: a calendar and to-do list, tools for keeping track of telephone calls, and a repository for notes. All the pieces are connected so that, for example, you have access to notes about someone when you bring up his or her name in the phone list.

Connections has a simple interface for importing data that allows you to set up an import template by dragging field names from the source file into the Connections card. If you schedule things in the calendar while offline, Connections later resolves scheduling conflicts.

Connections lists for $199. Its scripts are unlocked so that users can modify the stacks or add new stacks, and it has tools to help users create new stacks without scripting. Later plans include specialized modules for expense reports, integration with E-mail, project tracking, and a Sharp Wizard interface. Connections publisher Concentrix is in San Mateo, California, at 415/358-8600.—**D.L.**



Several linked HyperCard stacks in Connections. The telephone list, to-do list, and calendar share information.

Dataproducts Ships Plain-Paper Color Printer



Dataproducts, one of the originators of solid-ink printers, has brought out a plain-paper color printer for the Mac called Jolt PS. The printer uses solid inks that are melted and then finely sprayed onto the paper.

The Jolt PS has an Adobe PostScript Level 2 controller that supports form caching, pattern caching, CIE color matching, and data compression. The controller includes a Weitek RISC chip for faster processing of files. The printer can handle letter-size or legal-size paper through its paper tray, and odd-size paper through its manual-feed slot. The Jolt PS should ship in December at a list price of $6995. For more information, call Dataproducts in Woodland Hills, California, at 818/887-8000.—**T.M.**

Pen-Based Notebook Works with Mac



The pen-based Infolio notebook computer recently announced by PI Systems Corporation is designed as a portable electronic clipboard that can exchange information with Macs and other computers. Intended for vertical applications and including customized software for a specific use, the Infolio is expected to list for less than $2000, though the price was not final at press time. The Infolio is not intended to be a full-fledged personal computer. In a typical application, the Infolio might replace hard copies of patients' charts in a hospital.

Weighing in at less than 3 pounds, the Infolio includes a monochrome LCD screen with 640 by 480 resolution, a wireless stylus that the user presses against the display, and an internal battery that lasts up to 15 hours. The notebook measures 9 by 10 by 1.2 inches. It includes software for sharing data with Macs, IBM PCs and compatibles, and minicomputers.

The company expects volume shipments to start in February. For more information, contact PI Systems Corporation in Portland, Oregon, at 503/293-9585.—**T.M.**



The Infolio notebook computer from PI Systems can recognize handwriting and exchange information with Macs.

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19" SuperMac Color Display (SuperMac)

SuperMac's most affordable display for professionals who demand full-page resolution, impeccable color realism, and outstanding imagery. Its 1024 x 768 WYSIWYG resolution ensures that text and graphics appear the same on-screen as in print. And for color realism, SuperMac uses phosphors with an extended color range and tunes the display to a natural white point. Spectrum/8.24™ delivers 8-bit accelerated graphics on large-screen displays and 24-bit accelerated graphics for small-screen displays. Spectrum/8™ family provides 8-bit color for NuBus Macintosh systems. **Spectrum/8.24 PDQ DRI0437 $999. See line listing for further pricing. SuperMac Color Display MON0224**

$1799



FileGuard 2.7

$139

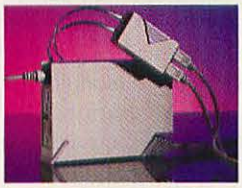
"It's sleek, fast, and safe. I highly recommend it."- MacUser April'91. FileGuard protects your hard disks, applications, files, and folders (including System folder) from unauthorized access, copying, and deletion. Includes screen locking and audit trail capability. Also available in 5 or 10-user packs. **UTI0135**



ScreenShot (Baseline Publishing)

ScreenShot1.2 (Baseline Publishing) Easily capture your screen images. Hit the user-definable key combination and this handy CDEV pops up a menu to specify whether you want to print or save it in one of several formats. Captures whole screens, windows, menus, or selected portions. **UTI0183 $34. Talking Moose and His Cartoon Carnival 4.0** uses charming, random messages to relieve the tedium of working long hours on your Mac. **ENT0403 $23. Thunder 7 1.0.4** checks spelling in any document. Save disk space and enjoy the convenience of teaching just one spelling checker new words only once. **SPL0029**

$56



Powerkey with Quickeys Lite Powerkey Remote

Turns on your Macintosh and peripherals from the keyboard. Can be programmed with an on/off schedule, and four outlets provide power line protection. Remote option lets you turn on your system with a single phone call. Works with all ADB-equipped Macs. PowerKey includes QuicKeys Light at no additional charge. **PowerKey ACC0535 $64. PowerKey Remote ACC0619**

$35



WristSaver/ Wrister MousePad (LB Innovators)

The WristSaver cradles your wrist with a contoured neoprene rubber pad and a nylon covering. It's ergonomically designed to support your wrist at the proper angle to help avoid the pain associated with Carpal Tunnel Syndrome. The WristSaver MousePad provides a comfortable rest for your wrist, plus a conventional mouse pad. Simple finger movements replace sliding the entire arm or Hand. WristSaverMousePad **ACC0634 $18.** WristSaver **ACC0550 $18** Bundle **BND0031** (Available in Gray, Black, Red or Navy)

$29

NEW



The PowerBundle (T/Maker)

The PowerBundle includes T/Maker's popular word processor, WriteNow, and their ClickArt for Fax and Field. Together, these will take care of your communications needs in style. The PowerUp AddressBookPlus 2.0 will give you instantaneous access to names and addresses. Business Expense Reports from Chipsoft automates the job of tracking travel expenses. America Online keeps you in touch with the world. Since the PowerBooks don't come with a carry case, the PowerBundle includes an elegant black cordura padded case with pockets for all your software and accessories. **BUS0193**

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ProModem 2496 S/R Minifax Plus

Complete data/fax solution in a mini-size. Get up to 9600 bps throughput on this 2400 bps data modem with V.42bis/MNP-5 data compression and error correction. Plus you get 9600 bps send/receive fax, all the software, and cable. **MOD0076**

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NEW



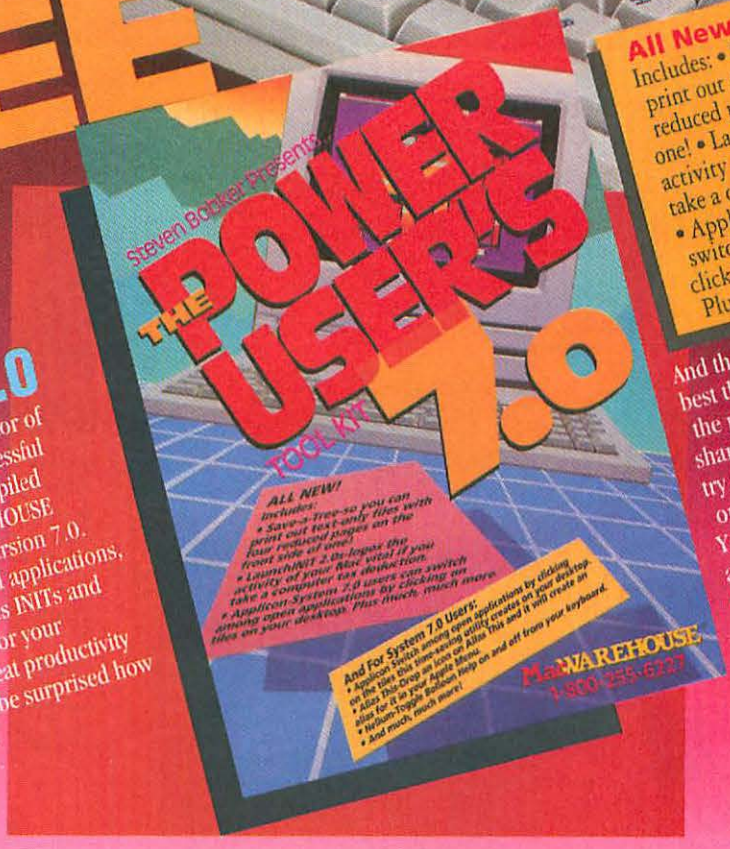
PICTURE IT!/Vocabulearn/ce (Penton Overseas)

Penton Overseas has developed a stimulating way to break the global language barrier... **PICTURE IT!** offers a highly interactive "bilingual" approach to a foreign language dictionary...complete with more than 500 high resolution graphics, native pronunciation, and expandable resource file. Create your own custom electronic dictionary, with sound, pictures and text...A must in any language learning environment! **EDU0292 $42.** Full line available. **Vocabulearn/ce** is now available in Level III, and Compact Disc to help expand your vocabulary base with thousands of new words and phrases! Vocabulearn/ce **$35. ea.** Compact Disc **$69. ea.** Full line available.

$42

FREE POWER USERS TOOL KIT 7.0

If you're not already a collector of Steven Bobker's highly successful Power User's Tool Kit -compiled exclusively for MacWAREHOUSE you'll want to start with version 7.0. It's stuffed with ten useful applications, utilities, desk accessories INITs and System 7.0 extensions for your Macintosh. They're great productivity enhancers and you'll be surprised how easy they are to use.



All New!
Includes: • Save-a-Tree- so you can print out text-only files with four reduced pages on the front side of one! • LaunchINIT 2.0s - logs the activity of your Mac - vital if you take a computer tax deduction. • Applicon - System 7.0 users can switch among open applications by clicking on tiles on your desktop. Plus much, much more.

And the best thing is, the programs are shareware so you can try them FREE when you order from MacWarehouse. You pay only $ 1.50 shipping and handling if you want the disk. If you wish to continue using the software, some authors ask that you pay a small fee ($ 5-$ 25). All the details are explained on the disk, which is yours to keep. Please remember to ask for item # AAA 0013 when you order.



Hayes Personal Modem 2400 Plus with Smartcom (Hayes)

The Hayes Personal Modem 2400 Plus provides you with everything you need to go on-line. This 2400 baud modem has a built-in call-monitoring speaker and two LEDs, plus both phone computer cables. Included in the package is the Smartcom terminal software to make using your modem simple and convenient. It fully supports the Mac interface. Also emulates popular terminals, such as TTY and VT52/102, to make mainframe and mini access easy. File transfer protocols include XModem and MacBinary. Smartcom even allows you to automate log-ons. **MOD0060**

$149



Blueprint 2.1

❼ Blueprint makes 2D drafting and design easy. It has a hierarchical symbol library, automatic alignment, auto-dimensioning, and witness lines. It calculates with 9-decimal precision, so you can work at any convenient scale. Blueprint offers unlimited layers, color, hatching, mirroring, and a built-in DXF translator. Blueprint also exports EPS files. **CAD0024**

$219



M. Y. O. B. 2.1

❼ M.Y.O.B. 2.1 is an INCREDIBLE ACCOUNTING SOFTWARE system for small to medium size businesses. Features include fully integrated general ledger, A/P, A/R, inventory, checkbook and card-file. Gives you features not found in accounting packages costing hundreds of dollars. Great Value! **FIN0087**

$139

Teleport, the ADB Modem (Global Village Communication)



❼ This 2400 baud modem with MNP5 data compression packs Hayes compatibility and error-free communication. TelePort plugs into your mouse (ADB) port and provides a pass-through connector for other devices. Uses no external power supply, and leaves your serial port free for other uses! **MOD0049 $139.** TelePortFAX includes SendFAX 9600 baud modem software. **MOD0058**

$185

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"Accountant Inc. is the most complete integrated accounting and financial management package for the Mac" says MacUser Magazine 3/91. Starting up with Accountant Inc. is quick and easy. Combines exceptional power with an elegant user interface to provide more flexibility and better reporting with less work. Unlike other packages, Accountant Inc. will grow as your business grows. Package includes Invoicing, Inventory, Receivables, Payables, Check Writing, Job Cost, Payroll, Integrated General Ledger and Financial Reporting.
FIN0048

$339



More After Dark (Berkeley Systems)

It's M.A.D.! It's More After Dark—Over 25 incredible new displays for After Dark, the Ultimate Screen Saver. Features contest winners Mowin' Man, Tunnel, GraphStat, and many beautiful new fish! Kittens, Art Museum, and Lunatic Fringe game module help save your screen from phosphor burn-in. (Requires After Dark software.)
UTI0230 $25.

After Dark 2.0
After Dark 2.0 displays over 35 screen savers including classics Flying Toasters and Fish! Includes sound, password protection, logo and message display.
UTI0119 $29. Buy both and save UTI0231

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First Things First



Simplifies the process of keeping track of your appointments. Place its floating, always-on-top DeskClock Button anywhere on screen and your schedule is always just a double-click away. Lets you put calendar items into up to 20 categories, Display windows tell you what you need to know at a glance. Special Offer: Free copy of LifeGuard included.
BUS0190

$49



Hand-Off II Ver. 2.2.1 (Connectix)

Get HAND-Off II for fast, easy file access. **SuperMenu™** for System 7 makes the Apple menu multi-level. Instantly open or browse an unlimited number of files, folders, applications or aliases hierarchically. **••Pop-up menuing** speeds opening files and applications with "Briefcases™" which create custom groups of applications and/or documents **••"On-the-fly" application subsitution** eliminates the "Application Not Found" error message **••Switches application color depth** and sound level automatically **••AutoHide™** reduces Desktop clutter by automatically hiding background applications.
UTI0148

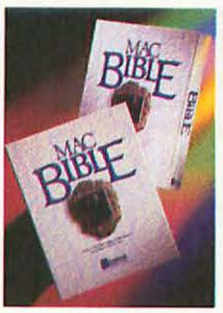
$56



MAXIMA 2.0

4MB SIMM users! MAXIMA 2.0 extends your RAM access to as much as 128MB. Creates a powerful non-volatile RAM disk that survives crashes, Restarts, and Shutdowns. Get MAXIMA 2.0 to maximize your RAM investment for System 6 or 7 in 24-or-32-bit mode. **UTI0209**

$45



MacBible King James Version

Revolutionize the way you study the Scriptures. Includes a flexible word-and-phrase search mode, a verse mode for displaying any range of verses, and a count mode for showing statistical information about words.
BOK0021

$79



PowerCache (DayStar Digital)

Affordable Speed with PowerCache. The best has just gotten better. Our new PowerCache is even faster and it fits into almost any Mac, from the LC and IIsi up to the IIci...you only change the adapter board, it's completely universal. Available in 25, 40 or 50 MHz speeds, it uses the proven Motorola'030 processor for 100% compatibility with all hardware & software including System 7. Get unparalleled performance that will triple the speed of any function from graphics to spreadsheets. Math chip available. 30 Day money-back guarantee. **See line listings for prices.**
PowerCache 40MHz

$949



Microphone II 3.0

Ideal for International telecommunications. Praised for its ease of use and advanced scripting language, Microphone II 3.0 now contains faster script execution, screen speed, file transfers and new interface design tools. Supports ZMODEM transfer protocol and can operate modems at any speed from 50 to 57,600 baud. **COM0043**

$215

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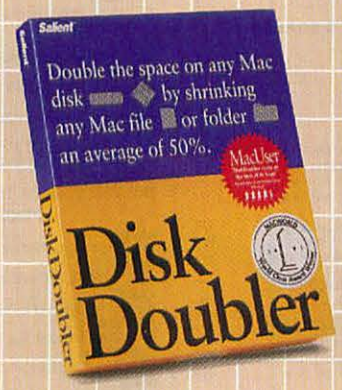
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MacPrint 1.2

Use a Macintosh with non-Apple printers. Print Mac applications on HP Laserjet, Deskjet or compatible printers including all Series IIs, IIIs and the Deskjet 500. Prints text and graphics at the printer's maximun reslution. Does not require PostScript. Cable is included. **UTI0098**

$95



DiskDoubler 3.7 (Salient Software)

DiskDoubler 3.7, the system 7 savvy version, compresses your files when you save them and automatically expands them when you open them. It doubles your hard disk and floppy disk storage capacity without the expense of an additional hard disk. DiskDoubler works transparently within any application, and operates in the background under MultiFinder. DiskDoubler works with documents, applications, plus sound graphics, and scanner files. **UTI0179**

$49

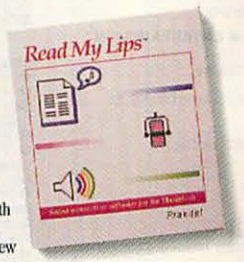
SPLAT'ERS



New color action game that pits you against multiple life-like opponents. It's played in a first person perspective in realistic 3-D. You are armed with a semi-automatic, compressed air powered pistol that fires balls of paint. Action involves both reflexes and strategy. SPLAT'ERS is quickly playable, never mastered, with many levels of difficulty. Runs in 16 colors. **ENT0388**

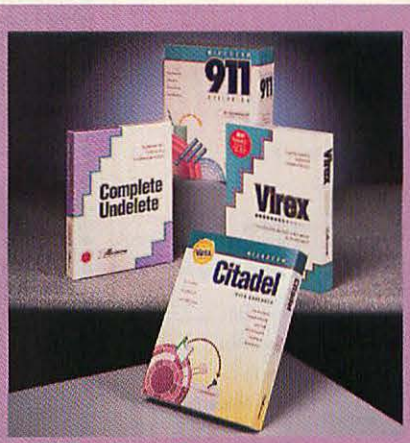
$37

Read My Lips



Attach sounds to documents you create using popular word processors, desktop publishing, and presentation software. Use pre-recorded sounds or record your own. Both the built-in microphones of the new Macs as well as MacRecorder are supported. **UTI0211**

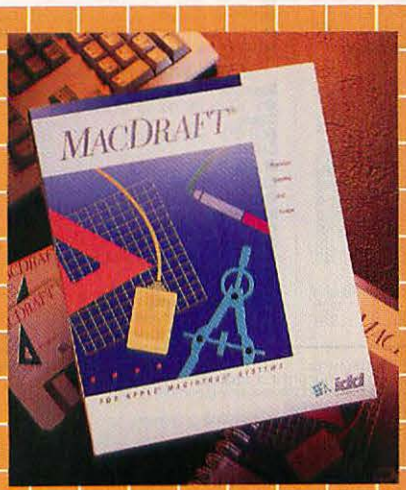
$75



Utilities Family (Microcom)

The **Virex** application program detects and repairs files infected by Macintosh viruses. The Virex 3 INIT repairs damaged files instantly before a virus can spread. **911 Utilities**, a collection of disk and file recovery tools, protects computer-based information from loss or damage so you'll never have to worry when your Mac goes down. **Complete Undelete** maintains a "Delete Log" of files thrown in the trash and recovers them if they were accidently thrown away. **Citadel** with Shredder, a security tool box, protects your computer from unauthorized access. **Virex 3.5 UTI0093 $59. 911 UTI0191 $89. Complete Undelete UTI0140 $49. Citadel UTI0233**

$89



MacDraft 2.1 (Innovative Data)

Provides the tools you need to create accurate drawings on your Mac. It supports PostScript output, has a removeable geometric drawing tool palette, multiple layers (limited only by available memory), on-line symbol libraries, 44 different scales, custom line styles, dimension lines, Bezier and spline curves, automatic area calculation, and smoothing of freehand shapes. MacDraft supports 32-bit QuickDraw and custom fill patterns in both black and white and color. Reads TIFF and MacDraw II files. **CAD0039**

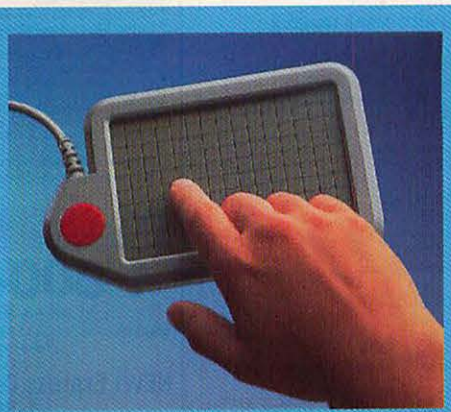
$279

Design Your Own Home:



Design Your Own Home: Architecture, Interiors, or Landscape. Create floor plans and building plans with structural details. Do individual room plans and kitchen/bath design. Then complete your dream house with graphic landscape plans. Interiors and Landscape programs generate 4 side views from top-view perspective. Sample plans included.

$65



The UnMouse (Microtouch)

The UnMouse does everything a mouse can—only faster, easier, and in less space. To move the cursor, simply slide your finger over the glass surface. To make a selection merely press down. The UnMouse also serves as an extended keyboard. Tap the large red button and you have a Power Keypad with 16 keys instantly available to execute macros (60 in advanced mode). With its one million touch points the UnMouse also performs as a small graphics tablet. **INP0084**

$159

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ACC0528 Ultimate Classic Carrying Case 65.
ACC0665 PowerBook Carring Case 75.
Kensington
ACC0621 Classic Anti-Glare Filter 49.
ACC0618 LaserStand 129.
ACC0459 SE Anti-Glare Filter 52.
ACC0497 Custom Track Ball-red pearlescent 12.
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BND0031 WristSaver/MousePad Bundle 29.
Sony
MED0031 Disks - 1.44 Mb High Density (3.5) 21.
MED0003 Disks - DS/DD (box of 10) 13.
Targus, Ltd.
ACC0252 MacPlus/SE Carrying Case (black) 65.
ACC0250 MacPlus/SE-Ext Keyboard Carrying Case 79.

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Aldus
✓BUS0066 Persuasion 2.0 339.
CE Software
✓GRA0070 CalendarMaker 3.0 31.
ChipSoft
✓FIN0132 MacInTax '91 65.
Claris
✓DAT0064 FileMaker Pro 215.
✓BUS0058 MacProject II 2.5 359.
✓BUS0178 Resolve 289.
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✓BUS0168 IdeaFisher 389.
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✓DAT0047 FoxBase+/Mac 2.0 295.
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✓BUS0100 TopDown 3.0 199.
Lotus Development Corporation
✓BUS0188 Lotus 1-2-3 for Macintosh 375.
Meca
✓FIN0039 A. Tobias' Managing Your Money 4.0 .. 139.
Microsoft
✓BUS0167 Microsoft Excel 3.0 309.
✓BUS0008 Microsoft PowerPoint 2.01 245.
✓BUS0181 Microsoft Project 1.1 449.
✓BUS0186 Microsoft Schedule+ 5 Pack 129.
✓BUS0014 Microsoft Works 2.0 165.
✓BUS0088 The Microsoft Office 1.5 509.
Portfolio Systems
✓BUS0101 Dynodex - The Instant Address Book 72.
✓DTP0055 DynoPage 72.
Power Up
✓BUS0153 Address Book Plus 2.0 65.
✓BUS0073 Calendar Creator 45.
✓BUS0121 FastForms 2.0 115.
Reality Technologies
✓FIN0068 WealthBuilder (Mac) 95.
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✓BOK0007 Letterworks 59.
✓BOK0016 Sales Letterworks 59.
Softsync/BLOC Publishing
✓FIN0048 Accountant Inc. 339.
SuperOffice
✓BUS0191 SuperOffice Single user 249.
✓BUS0192 SuperOffice1-5 users 999.
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✓BUS0176 GrealWorks 199.
✓BUS0055 More 3.1 265.
Synex
✓BUS0120 MacEnvelope Plus 2.0 185.
Teleware, Inc.
✓FIN0087 M.Y.O.B. 2.0 139.
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✓BUS0193 The PowerBundle 159.

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✓COM0098 RunPC/Network 279.
✓COM0103 RunPC/Remote 139.
CE Software
✓COM0100 QuickMail 2.5 (1 - 10 users) 379.
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✓NET0125 DaynaPORT E/Z 279.
✓NET0076 DaynaPORT E/SE 229.
✓Farallon™ Computing
NET0145 New PhoneNET Ethernet Card-MacII 219.
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✓NET0034 Timbuktu Remote® 3.0 135.
FreeSoft
✓COM0060 White Knight V.11 85.
Insignia
✓COM0107 SoftPC Universal 2.5 245.
Sitka
✓NET0049 MACTOPS 3.1 187.
Software Ventures
✓COM0094 Microphone II 3.0 215.
Technology Works
✓NET0133 GraceLAN 2.0 50-User 319.

DESKTOP PUBLISHING

Aldus
✓DTP0045 PageMaker 4.01 519.
✓DTP0040 Personal Press 1.01 109.
Quark, Inc.
✓DTP0049 XPress 3.0 519.
TimeWorks
DTP0048 Publish It! Easy with File IT! 2.1 139.

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ENT0356 SimEarth 40.
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✓MOD0058 TelePort/Fax 9600 185.
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MOD0065 Bundle 9600 Ultra SmartModem 829.
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✓MOD0043 2400 BPS Mini Modem 99.
✓MOD0047 Mini Send Fax 2400/9600 149.
✓MOD0071 9600 bps/ V.32&V.42bis Modem 399.
✓MOD0070 2400 bps V.42bis Mini Modem 149.
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✓UTI0130 FileGuard 2.7 - Office Pack 5 499.
✓UTI0131 FileGuard 2.7 - Office Pack 10 799.
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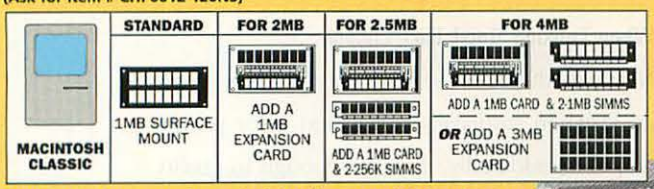
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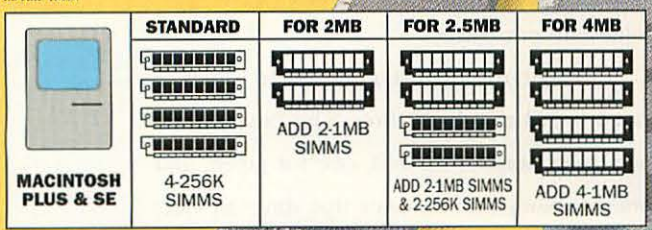
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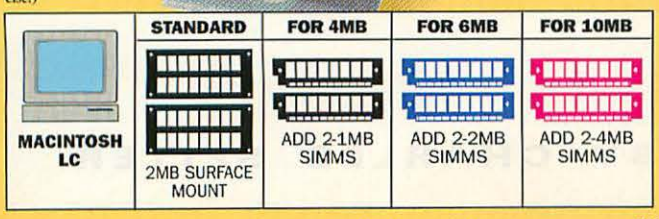
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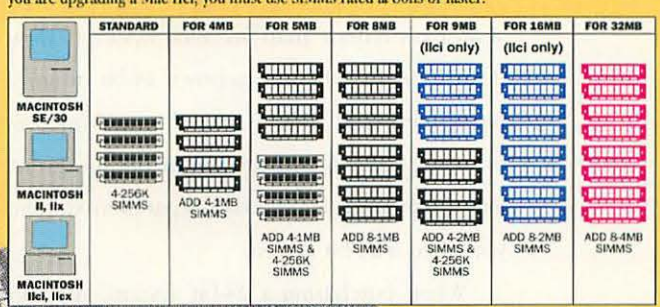
The Mac Classic comes with a standard 1MB of memory, which is surface mounted (soldered) to the motherboard. Additional memory for your Mac Classic is provided by an Expansion Board, which slides into a slot on the Classic's motherboard. The Expansion Board can be purchased with 1MB of memory (for a total of 2MB), and then two 1MB SIMMs can be added to the Expansion Board later, for a total of 4MB. Or, you can install a 3MB Expansion Board, which brings your Mac Classic up to its full 4MB.



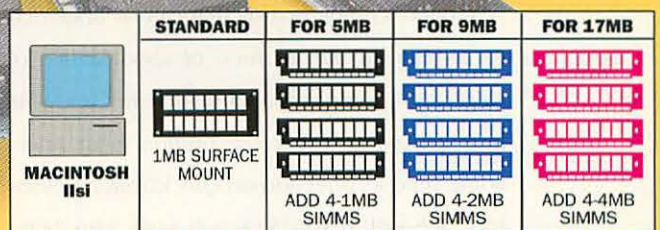
The Mac Plus and Mac SE have four available slots on the motherboard, which originally contain four 256K SIMMs modules — totalling 1 megabyte (1MB) of memory. To upgrade, you can replace each 256K module with a 1MB module, but you must do this in pairs. Replace two 256K modules and you will have a total of 2.5MB of memory. (That's the two new 1MB modules plus the original two 256K modules.) Replace all four modules and you'll have 4MB. (You should save the 256K modules for later use if you want to pass your Mac on to someone else.)



The Mac SE/30, II, IIx, IIcx, and IIci each come with a total of eight slots. The standard configuration has four 256K SIMMs modules, or a total of 1 MB. Here, memory must be upgraded in multiples of four. This allows for expansion from 1MB to 4, 5 or 8MB on the II and IIx, and up to 32MB on the SE/30, IIcx and IIci, depending on whether you are using 1MB, 2MB or 4MB SIMMs. If you are upgrading a Mac IIci, you must use SIMMs rated at 80ns or faster.



The Mac IIsi comes with a standard 1MB of memory, which is surface mounted (soldered) to the motherboard. Four slots are available for additional memory, and you must upgrade your Mac IIsi in multiples of four. The Mac IIsi is expandable to 5, 9 or 17MB, depending on whether you are using 1, 2 or 4MB SIMMs, and the SIMMs modules must be rated at 100ns or faster.



The Mac LC comes with a standard 2MB of memory, surface mounted (soldered) to the motherboard, with two slots available for additional memory. The Mac LC can be upgraded to 4, 6, or 10 MB, depending on whether you are installing 1, 2 or 4MB SIMMs.

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24-BIT MONITORS

Fast and Functional

Macworld Lab tests 26 color monitor systems and finds the quality top-notch

A big monitor displaying 24-bit color is an impressive sight. The more than 16 million colors on the screen match, and in some cases exceed, normal human limits for color perception—the expressions "photo-realistic" and "true color" are not exaggerations. Since our last roundup of 24-bit systems ("The 16 Million Color Question," *Macworld,* January 1991), prices have dropped dramatically, and dazzling acceleration-plus-video boards have arrived.

Still, 24-bit systems are more expensive and slower on redraw than are 8-bit systems. How do you decide whether to buy a 24-bit or an 8-bit system? One simple rule: if your work will eventually be sent to a true-color output device like a film recorder or color-separation system, you need a 24-bit system.

When purchasing a 24-bit system, you can often add components one at a time, rather than blowing a bundle on the works up front. Several vendors offer 8-bit boards that can be upgraded to 24-bit with the addition of about $1000 of video RAM; some companies also offer trade-ins in which you recover the original 8-bit price. Some vendors offer add-on QuickDraw accelerators, although if you do much work with 24-bit color, you'll be screaming for an accelerator by lunchtime the first day you use the system. More recently, vendors have begun offering video-input options for users who want to work in multimedia. The RasterOps 24XLTV board has built-in video input, while boards from E-Machines and Radius have provisions for adding video input later. And vendors such as Radius, RasterOps, and SuperMac offer 24-bit board alternatives to Apple's Macintosh Display Card 8•24.

When Looking Good Isn't Enough

Nearly all the 24-bit systems we tested look very good when displaying a scanned color photograph. Paradoxically, this isn't enough to qualify a monitor as a winner. Even if a monitor looks good when displaying a photographic image, you may have trouble printing accurately if the color values are not correct.

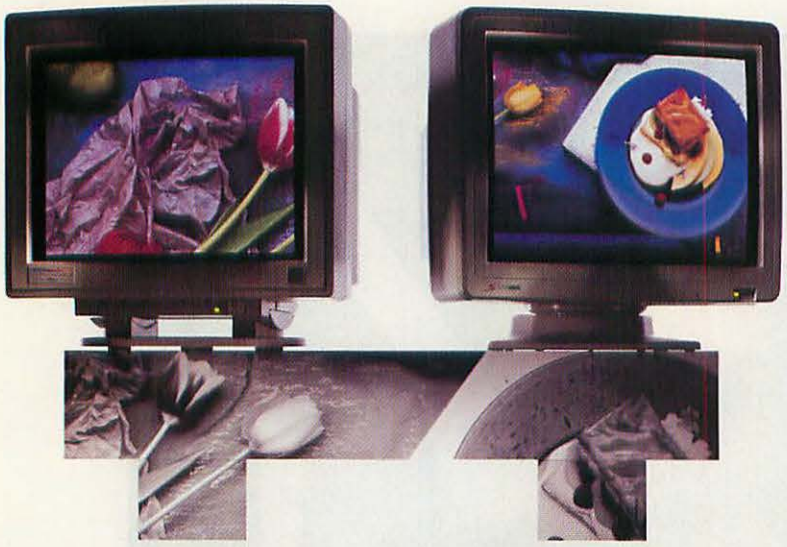
In order to create correct color values, a video board translates three 8-bit binary numbers (one number for red, one for green, and one for blue) into voltages that drive an electron gun in the monitor. An 8-bit number can specify 256 possible voltage levels, giving 256 intensities of red, green, or blue, and thus

PAUL FRANZ-MOORE

BY CHARLES SEITER



E-Machines' ColorPage T16 was a group favorite.



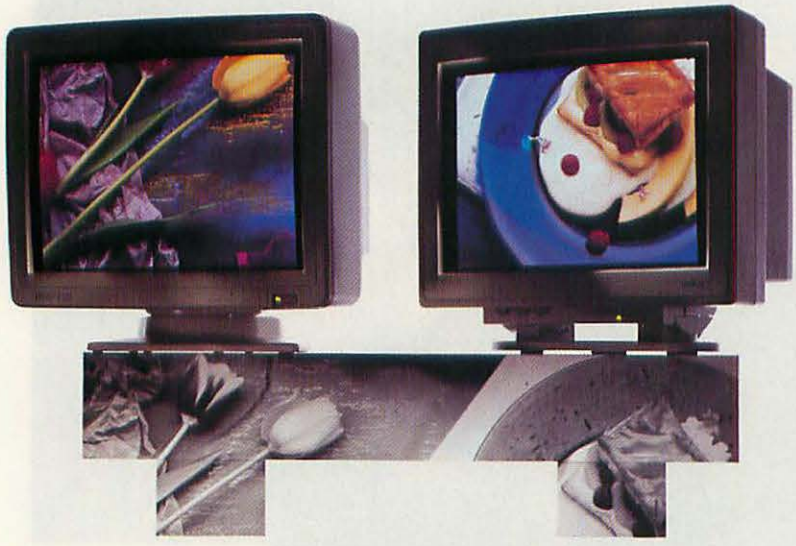
MacTel's SystemPro and SuperMac's 21" SuperMatch Two-Page Color Display are bargains.

16,777,216 possible colors (256 × 256 × 256). To get a midscale gray, for example, the Mac sends out the value 128 in each red, green, and blue channel; these equal values of red, green, and blue intensities produce white at half the maximum possible intensity. This example, however, assumes that the *tracking* (or alignment) of the electron guns is perfect, something that test results show is rarely the case.

Most systems use software to adjust the 8-bit values sent out by the Mac. Called *gamma correction,* this adjustment improves the tracking accuracy of the monitor. With patience and experimentation, you can make any monitor look like any other, at least in terms of absolute color value.

As it happens, your own visual system is so forgiving that a monitor doesn't need absolutely correct color values to make a good-looking picture. Note, for instance, that a monitor screen (or TV screen, for that matter) cannot look any blacker, photometrically, than it does when it's turned off. Your own visual processing system makes up the dark, velvety blacks you see near bright edges. Your eyes and brain play a variety of similar tricks at color boundaries as well—it's not much of an exaggeration to say that imaging, for both television and color monitors, is predicated on the range of human optical illusions. Basically, you always try to make the image you see on the monitor match your own understanding of what the image would look like in reality.

While a monitor with poor scores on convergence, gray linearity, distortion, contrast, and brightness can still show a visually appealing color image, you shouldn't necessarily buy one. Constantly adjusting screen images to match an original that you scanned in is a nuisance; worse yet, when the images are finally corrected, you may have trouble printing them with proper color values. Simple gamma correction also assumes a particular type of tracking error; a monitor with really serious tracking problems may always show a pinkish or pale-green or pale-blue cast.



RasterOps' 21" Color Hitachi Monitor and Radius's Color Display are two good choices.

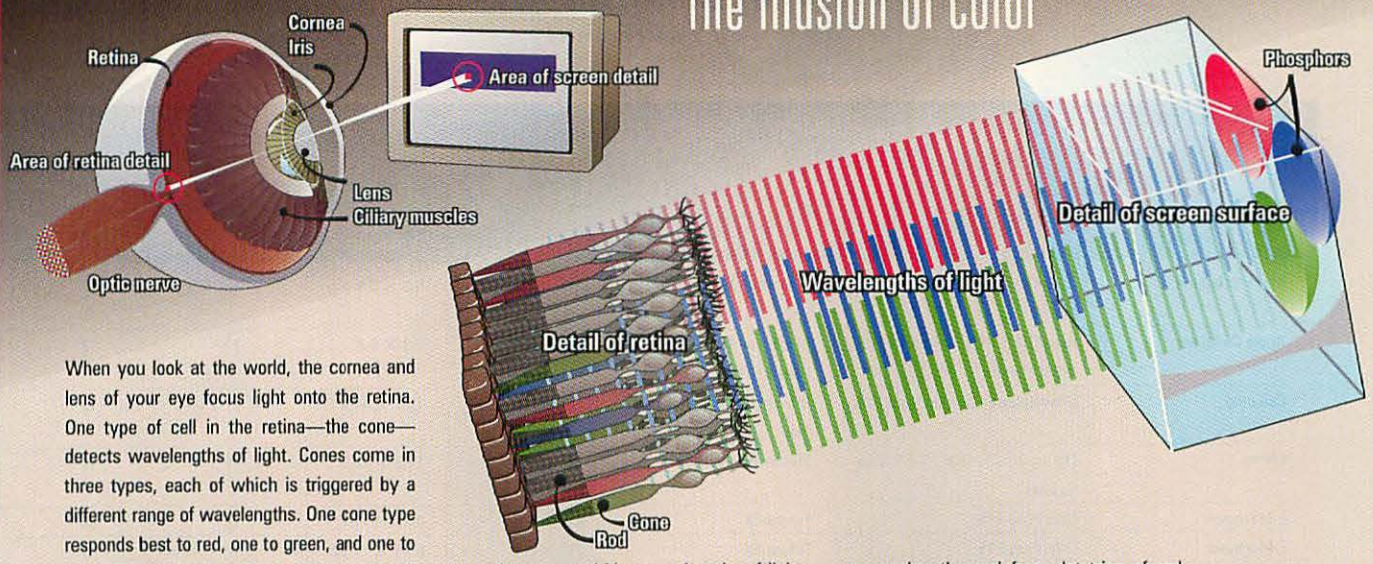
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The Importance of Convergence

A color monitor gives you a little something extra you don't get with monochrome: small color fringes around letters if the static convergence isn't set correctly. In Macworld Lab's convergence test, the worst performer had noticeable color fringes around black text. Monitors such as those from SuperMac—that showed intermediate to good performance on convergence tests—can usually be adjusted to perfection with manual controls. Thus, conveniently located horizontal and vertical static convergence adjustment knobs on the monitor become important.

In a series of subjective tests, we found that the monitors with the best clarity were those with dot densities higher than 72 dots per inch. Since 72 dpi is the Mac standard—and most print software is designed to make a 1-inch line at 72 dpi on the screen print to 1 inch on paper—to get what you see on a higher-resolution screen means adjusting the image's scale when you print from some software. But if you do as much work with text as with graphics, having better clarity is worth any printing adjustments you may have to make. The E-Machines TX, the Radius Color Display/21, and the SuperMac 21" SuperMatch Two-Page Color Display (the latter two are Hitachi-manufactured monitors) have

The Illusion of Color



When you look at the world, the cornea and lens of your eye focus light onto the retina. One type of cell in the retina—the cone—detects wavelengths of light. Cones come in three types, each of which is triggered by a different range of wavelengths. One cone type responds best to red, one to green, and one to blue. The eye sees white or gray when all three types of cones detect wavelengths of equal strength. The eye sees color when the cones detect wavelengths of varying strength.

Inside a monitor, electron guns fire beams of electrons in different voltages—representing the red, green, and blue wavelengths of light—at the screen. The colors that you see, arise when the screen's phosphor coating detects these streams of electrons. Similarly to the red, green, and blue cones in the retina, different types of phosphor are triggered by different wavelengths and form dot trios of red, green, and blue. These dots are close enough together that the human eye perceives a solid color. By combining varying amounts of red, green, and blue, a monitor can simulate nearly any color in the visible spectrum.

MW LAB 24-Bit System Speeds

All times are in ticks (1/60 second).

Color Key

- Fastest
- **Percent slower than fastest**
- Up to10%
- 11%–20%
- 21%–29%
- 30% or more

The monitors are grouped according to resolution; monitors with a high resolution run slower than monitors with a low resolution. Within the groups, monitors are listed from best overall performance (top) to worst overall performance (bottom). To determine the ranking of the monitors, we first indexed performance numbers within each test; then we calculated an overall index number. For each test, we indexed all monitors against the fastest product.

Some companies, such as MacTel and Mirror, do not offer a QuickDraw accelerator board for their monitors. Others, such as Apple, did not send us an accelerator to test; these monitors turned in the worst performances.

* The Precision Color 24x replaces the DirectColor/24 and its QuickColor accelerator.

** The resolution of the E16 with Futura SX board is 832 by 624.

Ranking by overall speed	Monitors with 1024 by 768 resolution	Scroll in several applications	Zoom in on a PageMaker file	Fill a region with color	Copy large blocks of data
1.00	SuperMac 19" SuperMatch (Thunder/24)	206	5.34	403	4
0.90	SuperMac 19" Dual Mode (Thunder/24)	214	6.28	406	5
0.80	SuperMac 19" SuperMatch (Spectrum /24 PDQ)	232	5.42	415	10
0.80	SuperMac 19" SuperMatch (Spectrum/24 Series III)	272	5.12	303	21
0.77	SuperMac 19" Dual Mode (Spectrum/24 Series III)	272	5.58	306	20
0.51	RasterOps 19" Color Trinitron Monitor (24XLi)	410	6.15	874	28
0.50	RasterOps 19" Color Hitachi Monitor (24XLi)	412	6.23	873	28
0.49	E-Machines TX (Futura MX)	447	6.45	779	32
0.49	E-Machines T19 (Futura MX)	449	6.53	784	32
0.45	Generation Systems Designer/24 20" (Designer/24)	631	5.87	796	83
0.44	Ehman 20" Trinitron 24-bit Color System (Ehman Display Board)	752	5.70	847	108
0.41	PCPC II (CGC2/32)	768	6.42	858	110
0.37	Mirror ProView/24 20" Color System (ProView/24)	898	6.82	950	138
0.36	MacTel SystemPro (24-bit SP card)	955	6.98	1003	149
0.36	MacTel SystemPro Sony (24-bit SPS card)	955	7.00	1009	150
	Monitors with 1152 by 870 resolution				
1.00	SuperMac 21" SuperMatch (Thunder/24)	214	6.20	406	14
0.96	SuperMac 21" SuperMatch (Spectrum/24 PDQ)	266	5.73	421	14
0.77	Radius Color Display/21 (DirectColor/24 with QuickColor)*	451	6.59	355	28
0.75	Radius Color Display (DirectColor/24 with QuickColor)*	450	7.23	355	28
0.59	RasterOps 21" Color Hitachi Monitor (24XLi)	452	7.41	867	28
0.58	CalComp ChromaVision QuickPlus (ChromaVision QuickPlus)	469	7.59	795	28
	Monitors with 640 by 480 resolution				
1.00	E-Machines ColorPage E16 (Futura EX)	358	2.12	781	33
0.95	E-Machines ColorPage T16 (Futura EX)	307	3.25	784	32
0.85	E-Machines ColorPage E16 (Futura SX)**	399	4.15	786	34
0.77	MacProducts MagicView (Seiko) (ColorBoard 264)	454	2.22	813	93
0.53	AppleColor High-Resolution RGB (Display Card 8•24)	554	4.86	946	140

24-BIT SYSTEMS COMPARED

Company	Name of monitor	Name of display board	Resolution (horiz. x vert., in pixels)	Active screen area (horiz. x vert., in inches)	Diagonal screen size (in inches)	Pixel density (in dots per inch)
Apple Computer	AppleColor High-Resolution RGB Monitor	Macintosh Display Card 8•24	640 × 480	9.3 × 6.8	13	72
Apple Computer	AppleColor High-Resolution RGB Monitor	Macintosh Display Card 8•24 GC	640 × 480	9.3 × 6.8	13	72
CalComp	DrawingCard ChromaVision Plus	DrawingCard ChromaVision Plus	1152 × 870	15.5 × 11.6	21	72
Ehman	Ehman 20" Trinitron 24-bit Color System	Ehman Display Board	1024 × 768	14.3 × 10.7	19	72
E-Machines	ColorPage E16	Futura EX	640 × 480	8.75 × 11.6	16	55
E-Machines	ColorPage E16	Futura SX	832 × 624	8.75 × 11.67	16	72
E-Machines	ColorPage T16	Futura SX	832 × 624	8.75 × 11.6	16	72
E-Machines	E-Machines T19	Futura MX	1024 × 808	13.6 × 10.75	19	76
E-Machines	E-Machines TX	Futura MX	1024 × 808	9.28 × 11.75	16	87
Generation Systems	Designer/24 20" Color System	Designer/24	1024 × 768	14.25 × 10.75	20	72
MacProducts USA	MagicView 14" Seiko	MagicView 14" 24-bit	640 × 480	9.75 × 7.14	14	72
MacProducts USA	MagicView 20" Seiko	MagicView 20" 24-bit	1024 × 768	14.25 × 10.75	20	72
MacTel Technology	SystemPro	24-bit SP card	1024 × 768	14.3 × 10.7	19	72
MacTel Technology	SystemPro Sony	24-bit SPS card	1024 × 768	14.3 × 10.8	19	72
Mirror Technologies	Proview/24 20" Color System	Proview/24	1024 × 768	14.3 × 10.7	20	72
Nutmeg Systems	Nutmeg 19C	N24C192	1024 × 768	14 × 11	20	72
PCPC	PCPC II	CGC2/32	1024 × 768	14 × 10.5	20	72
Radius	Radius Color Display	DirectColor/24 [2]	1152 × 882	14.3 × 10.8	19	75
Radius	Radius Color Display/21	DirectColor/24 [2]	1152 × 882	14.4 × 11.3	21	78
RasterOps Corporation	19" Color Hitachi Monitor	RasterOps ColorBoard 24XLi	1024 × 768	14.4 × 10.75	19	72
RasterOps Corporation	19" Color Trinitron Monitor [4]	RasterOps ColorBoard 24XLi	1024 × 768	14.4 × 10.75	19	72
RasterOps Corporation	21" Color Hitachi Monitor	RasterOps ColorBoard 24XLi	1152 × 870	15.5 × 11.8	21	77
Seiko Instruments	CM1445	RasterOps 24S	640 × 480	9.4 × 7.1	14	72
Sigma Designs	ColorMax Display	ColorMax 8/24 24-bit Controller	1024 × 768	14.2 × 10.7	19	72
SuperMac Technology	19" Dual Mode Trinitron Display	Spectrum 24/Series III [5]	1024 × 768; 1152 × 870	14.2 × 10.67	19	72; 82
SuperMac Technology	19" SuperMatch Color Display	Spectrum/24 Series III [5]	1024 × 768	14.2 × 10.67	19	72
SuperMac Technology	21" SuperMatch Two-Page Color Display	Spectrum/24 PDQ [6]	1152 × 870	15 × 11.2	21	77

● = yes; ○ = no. [1] *The Futura EX can be upgraded to the Futura SX.* [2] *Radius will replace the DirectColor/24 with the Precision Color 24x board, which includes QuickDraw acceleration.* [3] *RasterOps 24XLTV board ($3999) has the same features as the RasterOps 24XLi's plus input connectors for S-Video, NTSC, SECAM, and PAL.* [4] *RasterOps offers the same 19" Trinitron monitor with a black case. It is called the 19" Signature Series Black Trinitron Monitor.* [5] *SuperMac's Spectrum/24 PDQ ($3999) and Thunder/24 ($4999) also work with this monitor. These video boards have the same features as the Spectrum/24 Series III plus faster QuickDraw acceleration.* [6] *SuperMac's Thunder/24 ($4999) also works with this monitor. The Thunder/24 has the same features as the Spectrum/24 PDQ's plus faster QuickDraw acceleration.*

excellent clarity and are very easy on your eyes.

Extras That Count

Big color pictures require an enormous amount of computation—retouching an 8½-by-11-inch image in Adobe Photoshop calls for a quantity of processing that was the exclusive domain of NASA ten years ago. Simply transferring color data from the video board to the screen over the NuBus is many times slower on a 24-bit system than it is on a monochrome system. That's why if you work with 24-bit images frequently, you'll appreciate the extra speed a QuickDraw accelerator can provide.

In Macworld Lab tests last year ("Fast Color," *Macworld*, January 1991) we found that accelerators with similar specifications gave comparable performance when used with applications software. Some fast new boards, such as SuperMac's $4999 Thunder/24, upset this relative democracy. Large 24-bit pictures can be manipulated and adjusted in a few seconds (see "24-Bit System Speeds"). Other vendors will release similar accelerators later this year.

While most of us are still wondering whether to move up to a 24-bit color system that costs as much as a good used Daihatsu, advanced think-

Static convergence control (horiz./vert.)	Gamma-correction software	QuickDraw accelerator (On-board/optional)	8-bit board (upgradable/can trade in)	System warranty (in years)	Video input (built-in/optional)	Included output (NTSC/PAL)	Price of video board	Price of monitor	Price of system
●/●	○	○/○	○/○	1	○/○	○/○	$699	$999	$1798
●/●	○	●/○	○/○	1	○/○	○/○	$1999	$999	$2998
○/○	○	●/○	○/●	1	○/○	○/○	NA	NA	$6995
●/●	●	○/○	○/●	1	○/○	○/○	NA	NA	$3499
○/○	●	●/○	○[1]/○	1	○/●	●/●	$795	$1595	$2390
●/●	●	●/○	●/●	1	○/●	●/●	$1495	$1595	$3290
●/●	●	●/○	●/●	1	○/●	●/●	$1495	$2500	$4195
●/●	●	●/○	○/○	1	○/●	●/●	$1995	$4200	$6195
●/●	●	●/○	○/○	1	○/●	●/●	$1995	$2500	$4495
●/●	○	○/○	○/○	1	○/○	○/○	$1995	NA	$5495
○/○	○	○/○	○/●	1	○/○	○/○	$399	$619	$1018
●/●	○	○/○	○/●	1	○/○	○/○	$1299	$2199	$3498
●/●	○	○/○	●/●	1	○/○	○/○	$1499	NA	$3349
●/●	●	●/○	●/●	1	○/○	○/○	$1499	NA	$3997
●/●	○	○/○	○/●	1	○/○	○/○	NA	NA	$3499
●/●	●	○/○	○/●	1	○/○	○/○	NA	NA	$4899
○/○	●	○/○	●/○	1	○/○	○/○	NA	NA	$2995
●/●	●	○/●	●/○	1	○/●	○/○	$3395	$4295	$7690
○/○	○	○/●	●/○	1	○/●	○/○	$3395	$4495	$7890
○/○	●	●/○	●/○	3	○[2]/○	●/●	$3499	$2799	$6298
●/●	●	●/○	●/○	3	○[2]/○	●/●	$3499	$4299	$7798
○/○	●	●/○	●/○	3	○[2]/○	●/●	$3499	$4499	$7998
○/○	○	○/○	○/○	1	○/○	○/○	$699	$899	$1894
●/●	●	○/○	●/●	1	○/○	○/○	$2395	$4295	$6690
●/●	●	●/○	○/●	3 (monitor); 5 (board)	○/○	○/○	$2999	$4200	$7199
○/○	●	●/○	○/●	3 (monitor); 5 (board)	○/○	○/○	$2999	$2800	$5799
○/○	●	●/○	○/●	3 (monitor); 5 (board)	○/○	○/○	$3999	$4400	$8399

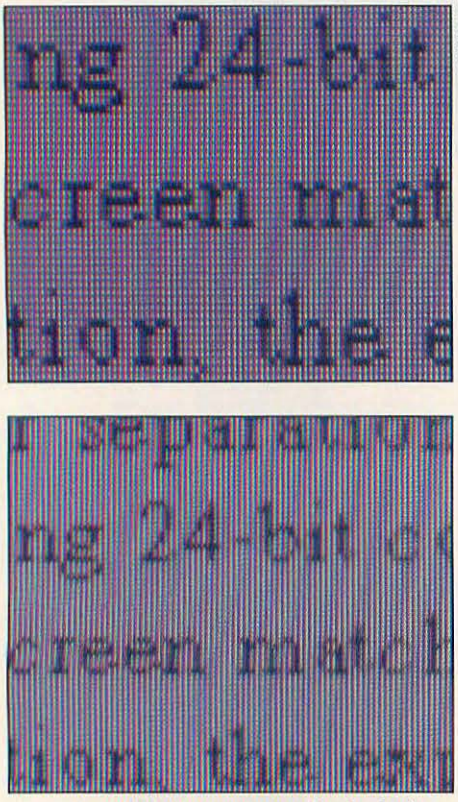
ers are pondering the video implications of multimedia, with cost a secondary consideration. One of the simplest ways to get pictures for use in a presentation is to route a signal from a camera or VCR into a Mac. One of the boards we tested, the RasterOps 24XLTV board running the RasterOps 21" Color Hitachi Monitor, includes, along with accelerated 24-bit color, input connectors for S-Video and all three kinds of common composite broadcast video signals (the U.S. standard NTSC and the European SECAM and PAL), plus software for acquiring images from a TV screen. The 24XLTV packs a lot of functionality into one board, demonstrating RasterOps' engineering prowess.

E-Machines offers an analogous product—the QuickView Studio Multimedia Workstation. The $7460 system includes 24-bit color, QuickDraw acceleration, video input, and a ColorPage T16 monitor. Unlike the RasterOps 24XLTV, however, the QuickView Studio's functions are distributed over a set of several small boards, which can be added one at a time to the base Futura SX system. It's an open secret that other vendors will offer products for graphics-plus-video manipulation in the next year.

Buying Hints

A couple of buying tips can save you money and annoyance. First, if you're thinking of a 24-bit system, you should take the type of image you typically work with to a dealer to determine a screen size that suits you. Second, smaller monitors show less within-brand variation on objective tests than the bigger ones. If you can live with a 16-inch or even smaller system rather than a 21-inch system, you can save enough money to buy a spare Classic for accounting.

The variation in convergence from monitor to monitor, even from a single manufacturer, is large enough



Most monitor/display board combinations for the Macintosh give you 72 dpi, like the E-Machines T16/Futura SX shown above (top). At 85 dpi, the TX16/Futura MX combination lets you view about 20 percent more text in the same amount of screen space. This is an advantage for viewing layouts with two facing pages and large spreadsheets.

Rating 24-Bit Monitor Quality

Longer bars are better.

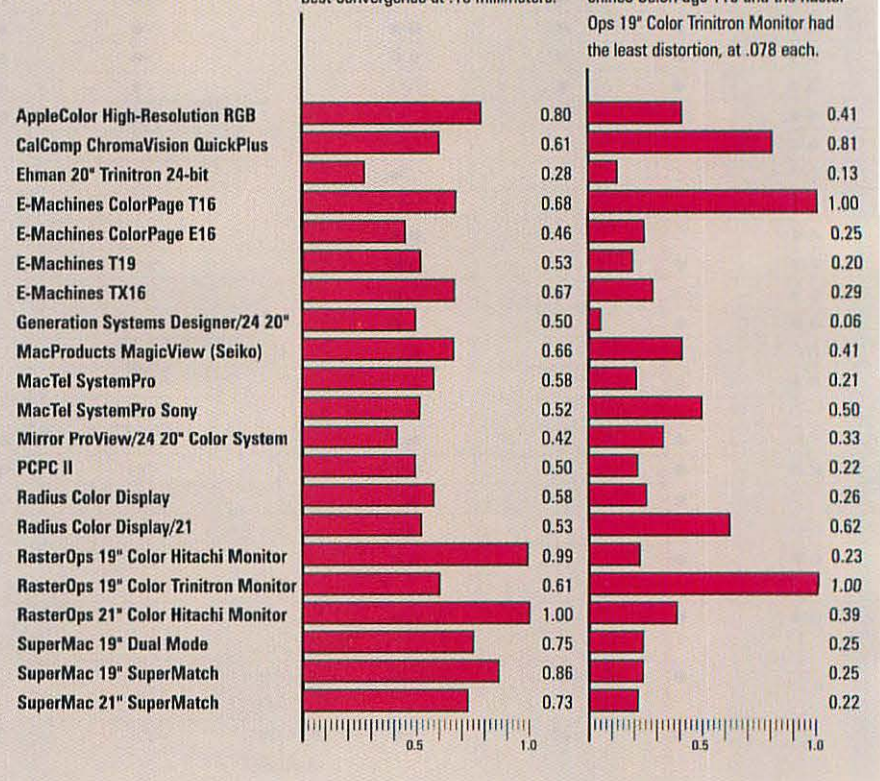
The best monitor in each test received an index of 1.00 (the number on the right of the bar).

Convergence

Convergence denotes how closely red, green, and blue electrons meet on the same spot on a screen. The better a monitor's convergence, the more accurately the monitor renders color. We used a Klein convergence meter to measure convergence. The RasterOps 21" Color Hitachi Monitor had the best convergence at .18 millimeters.

Distortion

A monitor's level of distortion determines how geometrically correct an object appears on screen. None of the monitors had very noticeable distortion. We measured (in 64ths of an inch) the total amount of distortion displayed in 9 squares at various locations on the screen. The E-Machines ColorPage T16 and the RasterOps 19" Color Trinitron Monitor had the least distortion, at .078 each.



to be significant on small text. If you need to switch frequently between graphics and small text, you should try to see a demonstration of 6-point Helvetica on the actual monitor you're going to buy. Finally, if you're attracted to the generally lower prices of mail-order firms, make a few phone calls to see how long it takes to get through to customer support.

Some Encouraging Words of Advice

Even though we have our favorites, it's hard to buy a monitor that's truly bad. Some systems look pinker or bluer when set to white, and a few have convergence problems that show color fringing on black text. But the statistics are in your favor: all the monitors we tested are subjectively acceptable to everyone who saw them.

Most 24-bit color boards also give subjectively acceptable visual performance. Their circuits are remarkably similar—there are only so many ways to do a three-channel digital-to-analog conversion with standard commercial chips. The big difference lies in acceleration schemes, which show greater variety and greater performance differences. Note, for example, that of the 26 monitor-board combinations we tested, SuperMac boards appear in the top speed positions.

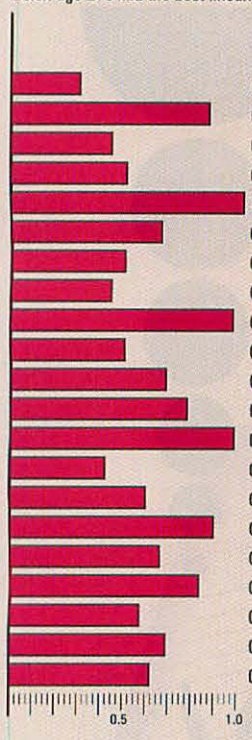
If you do color work professionally, you'll work more efficiently with a fast system and a big monitor. If you have to economize, you're better off picking a smaller monitor than opting for a less capable video board and accelerator. Finally, if you don't know if you really need 24 bits, it means you don't. Either buy the 8-bit version of a board that can be upgraded, or wait for the price of video RAM to drop. All that said, here are our top picks.

MW EDITORS' CHOICE

If you just won the lottery, or have a business use that justifies it, get a SuperMac 21" SuperMatch Two-Page Color Display with a Spectrum/24 PDQ

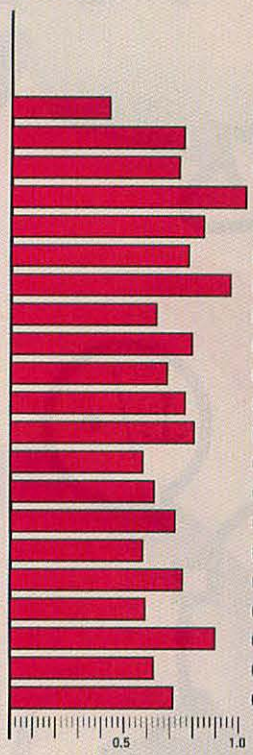
Gray Linearity

Gray linearity indicates how accurate colors stay as they lose luminance. To test gray linearity, we used Apple's Color Picker to reduce the luminance of red, green, and blue in increments of 10 percent. We used a Minolta color analyzer to measure the luminance coming from the screen at each percentage drop. The E-Machines ColorPage E16 had the best linearity.



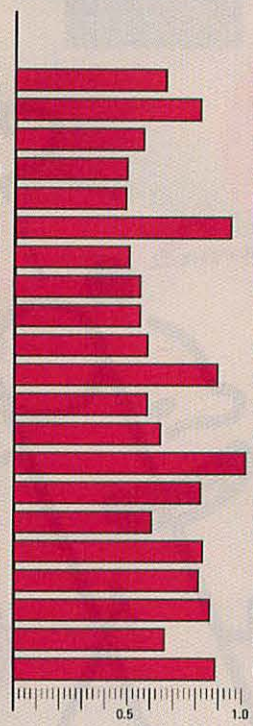
Brightness

In subjective tests, most people prefer a brighter monitor. For this objective test, we turned the brightness up as high as it could go without showing scan lines on the monitor. We used a Minolta luminance meter to measure brightness. The brightest monitor was the E-Machines ColorPage T16 at 43.2 footlamberts.



Contrast

The better a monitor's contrast, the better you can see details in light or dark areas of an image. We placed white squares on a black background and used a Minolta luminance meter to calculate the ratio between the luminance in the white squares and the black background. We averaged the ratios. The Radius Color Display had the best contrast ratio, at 13:1.



board, or better yet, the super-fast Thunder/24. The color on these systems is beautiful, the text is crisp, and they just edged out the Radius Color Display/21 and the RasterOps 21" Color Hitachi Monitor in subjective evaluation. The rich functionality of the RasterOps 24XLTV board makes it a good alternative for video-based graphics work and serious multimedia, but for professional, day-to-day color imaging, SuperMac's speed advantage justifies its prices.

On the other hand, buying a 24-bit color system might mean you won't get a decent vacation again this decade, and you'll have to explain this to a spouse or associate. MacTel's SystemPro 20-inch Ikegami, a system that consists of a 24-bit board bundled with a 20-inch Ikegami Trinitron monitor, is a surprise bargain. At $3349, the SystemPro shows beautiful, rich colors and sharp text. On the downside, the SystemPro has languid performance unless you upgrade it with an optional QuickDraw accelerator. The standard board runs about twice as slowly as most other systems and as much as five times slower than the systems at the top of the speed list. This is acceptable if you edit color images occasionally, but if you work with color graphics every day, you should budget for an accelerator.

If you had walked into the Macworld Lab and seen the group of 24-bit monitors all showing the same picture, you would have noticed immediately how good the familiar old 13-inch AppleColor High-Resolution RGB Monitor looks—if the criterion for color is that the screen should look like a big color slide, the Apple system with the Macintosh Display Card 8•24 GC gets top marks. This monitor also looks great with the Radius DirectColor/GX, and with the GX it's faster, too.

Some of the AppleColor High-Resolution RGB Monitor's superiority can be traced to inherent appearance and speed advantages in smaller monitors. The smaller the area, the easier it is to keep bright. Smaller screens also have fewer pixels that need to be redrawn and updated—the lack of QuickDraw acceleration won't give you fits when working with 24-bit images. The MagicView 14" Seiko monitor offered by MacProducts is an alternative to the Apple—a small monitor with good color and sharp text at a price that still lets you pay the rent this month.

The 16-inch systems from E-Machines offer beautiful color and clear text, they have been configured as a product line so that you can start relatively cheaply, choosing either an 8-bit system upgradable to a fancy 24-bit system or a low-priced basic 24-bit board. The TX and ColorPage T16 monitors rate a bit better in subjective testing than the ColorPage E16, but there's no agreement that it's a $1000 difference. It's a particularly attractive selling point that E-Machines has a rational upgrade path, and that their technical support is invariably competent and prompt. M

See *Where To Buy* for contact information.

Macworld *contributing editor*
Charles Seiter *works on problems in color-image analysis and compression for a San Francisco electronics firm.*

JOHN HERSEY

Top Draws

Illustration programs appeal to a broad audience. But do they measure up to their billing? We look at eight aspirants.

by Deke McClelland

Draw programs have transformed hundreds of thousands of Macintosh owners into part-time artists and have given professionals a powerful new medium of expression. Since Apple first introduced MacDraw, draw programs have surged ahead in offering innovative features that cater to the novice and the experienced user.

To satisfy users' increasingly diverse appetites, draw programs are getting more specialized, accommodating everything from business charts to magazine covers to product designs. Despite this diversity, there remains a core of general-purpose draw packages designed to handle the broad needs of everyday users.

Two of these programs—Adobe Illustrator and Aldus FreeHand—are illustration programs that rely on PostScript-language routines, just like those used by the Apple LaserWriter IINTX and other high-end printers. The remaining packages—Canvas and UltraPaint from Deneba Software, DeskDraw (with its companion product DeskPaint) from Zedcor, MacDraw Pro and MacDraw II from Claris, and Michael's Draw from Event One—take advantage of the Mac's built-in QuickDraw-language graphic routines.

The fact that a program communicates in PostScript or QuickDraw neither impairs nor enhances its ability to create quality artwork, but each category of program can access a handful of exclusive language-based features that make it unique.

Mastering the Fine Line

The fundamental strength of any draw program depends on the performance of its drawing tools. All draw programs provide a collection of tools for creating the most basic geometric objects—rectangles and ovals—that translate to a wide variety of designs. Michael's Draw, Canvas, UltraPaint, DeskPaint, and MacDraw Pro provide regular polygon tools for drawing triangles, parallelograms, pentagons, and so on, all the way up to shapes with 100 straight sides. Canvas and UltraPaint also offer tools for drawing stars and boxes in perspective.

Geometric tools are great for creating flowcharts, icons, and other graphics that require simple symmetrical shapes, but when drawing from life, you need to construct free-form outlines that curve according to predictable and governable guidelines. There are two common models for creating naturalistic curves. The first, the *smooth polygon* model, was introduced by MacDraw. After drawing a free-form polygon with straight

sides, you apply the Smooth command to round out the corners and bend the line segments. The result is a gently flowing shape with neither a crimp nor a pucker.

But sometimes you *want* crimps and puckers. When drawing a smooth polygon, the only way to create a corner between two curving segments—a *cusp*—is to drag one point in the shape directly in front of its neighbor. Fortunately, Canvas lets you fuse these two coincident points into a single cusp; the other programs treat the points as forever unrelated, hindering the reshaping process.

Recently, MacDraw Pro updated the smooth-polygon model by letting you smooth or unsmooth selected points independently of other points. Straight edges and curves can now harmoniously exist side by side.

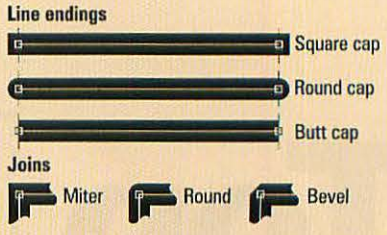
But even the improved smooth-polygon model provides no way to anchor points in a shape's outline while independently controlling the curvature of its segments. This is the gap filled by *Bézier curves*, the second and more versatile drawing model. Segments are stretched tightly between points, like a soft wire wrapped around a pattern of nails. Each point may offer up to two control handles, each of which tugs at a segment, bending it in the direction of the tug.

When Bézier curves were introduced by Illustrator in 1987, many pundits realized their drawing potential but doubted they would catch on with the average user. Bézier tools are now so prevalent that, of the seven products reviewed, only DeskDraw and Michael's Draw lack them.

Despite their prevalence, not all Bézier curves are treated equally. Illustrator, FreeHand, Canvas, UltraPaint, and MacDraw all let you define two kinds of points when drawing a Bézier curve: a point with no control handle (called a *corner point* because it defines a corner between two segments) and a point with two control handles locked into symmetrical alignment (called a *smooth point* because it affords a smooth arc from one curving segment into the next). However, only Illustrator and FreeHand let you define a *cusp point*—a point with either one control handle or two independent control handles—when creating an object. In other programs, you must go back and edit the shape to convert an existing corner point or smooth point to a cusp point. (MacDraw Pro lets you hold the option key to create a cusp point, but it still requires shape editing later, for example, to make one segment a curve while leaving the other as a straight line.) This sounds like a minor detail, but once you become familiar with the Bézier-curve model, you will find it irritating to constantly reshape curves.

Making the Most of Your Lines

PostScript draw programs offer several shapes for line endings and corners, as shown. How you use these line caps and joins affects your design. Two examples are miter joins on sharp corners and butt caps on dashed lines.



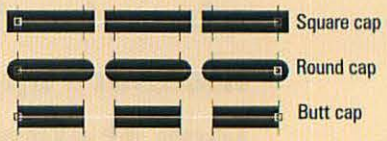
Better Sharp Corners

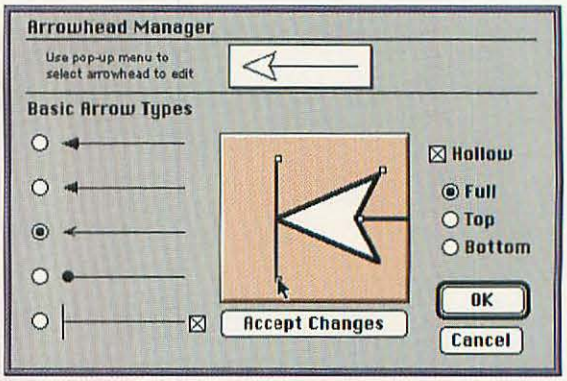
A miter join on a very sharp corner results in an extended spike that can look bad. Most programs offer a miter limit option that lets you define the threshold angle at which corners with a miter join are changed to have bevel joins.



Better Dashed Lines

Line endings affect the appearance of a dashed line. There is less space between lines with square or round caps than there is between dashes with butt caps. The programs base spacing on the end points, not on where the caps end.





Electronic Flint Both Canvas (shown here) and MacDraw let you create custom arrowheads. Canvas lets you create a collection of six arrowheads and store it with a document. An arrowhead can assume one of several basic shapes and have a perpendicular tip, appear hollowed, or be halved.

Appearance Is Everything

By itself, a computer-drawn line has no substance—you need to give it color and thickness, just as you would choose a pen if you were drawing by hand. Both Illustrator and FreeHand offer *stroke* options that define the appearance of a line. Canvas, MacDraw, and the rest of the QuickDraw crowd offer *pen* options. Stroke and pen are similar in that they let you specify a line's thickness (its *weight*) and apply dashed patterns to create coupon borders and the like. But beyond that, stroke and pen attributes differ. In Illustrator and FreeHand, you can adjust how a line ends by assigning one of three *cap options*—square, round, and butt—all of which are based on PostScript routines. You can also adjust the appearance of corners using one of three *join options*—bevel, round, and miter (see "Making the Most of Your Lines").

Lines drawn in Canvas and MacDraw Pro end in only one way (square

DRAWN INTO THE FUTURE

The future looks like a real blast from the past. Two of the oldest names in Macintosh graphics—SuperPaint and Cricket Draw—have risen from the dead to claim their slices of the object-oriented graphics pie. Both products have seen the highs and horrors of the software industry. They were bright up-and-comers from promising start-up companies one day (Silicon Beach and Cricket) that were wheezing on the auction block the next. Finally they were bought up by big corporate giants (Aldus and Computer Associates). Now they return as the adopted offspring of the Fortune 500.

Despite the dubious quality of their previous incarnations, both applications in their new form qualify as breaths of fresh air.

The first of the revivalists, Aldus SuperPaint 3.0, introduces textures, which are custom patterns composed of objects, bitmaps, or both. Textures can be applied to the interior or outline of any text block or graphic object (see "Text Meets Texture"). SuperPaint 3.0 also provides support for the TIFF and EPS formats, 24-bit color painting capabilities, multiple color gradations, and a handful of new draw and paint tools. SuperPaint 3.0 retails for $199 and is available to registered users of any previous version of SuperPaint for $65.

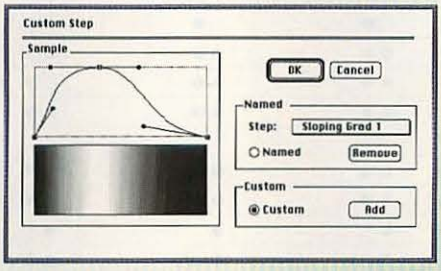
But my candidate for the most amazing reincarnation of the year is CA-Cricket Draw III. Forget that Cricket Draw 1.0's only claim to fame was that it introduced thousands of artists to the system error. Pay no attention to the fact that Cricket Draw II never got beyond the cutting-room floor. CA-Cricket Draw III is a whole new creature.

Among its new capabilities is a powerful gradation feature that not only lets you establish automated fountain effects but also provides control over the speed and manner in which a gradation tapers from one color to the next (see "Totally Gradual"). Other enhancements include live sampling, which lets you see the results of dialog-box changes as you make them; automatic color dithering for low-end color printers; 24-bit color display; and compatibility with major color-separation utilities.

When it ships, CA-Cricket Draw III will be the only QuickDraw program except Michael's Draw to support masking and hole-cutting. And if called on to do so, CA-Cricket Draw III will generate a PostScript definition of the current document that high-end users can tweak and edit. Changes to the drawing are immediately updated. The program will retail for $245. Registered owners of any previous version of Cricket Draw can upgrade for $49.95.



Text Meets Texture Aldus SuperPaint 3.0 lets you save selected images to disk as a texture file. The images can then be accessed inside any file and applied to the fill or pen of both text and graphics (here, the background behind *effects*).



Totally Gradual Using a Bézier-curve model, you can specify the slope of a gradient fill with CA-Cricket Draw III. By adjusting the locations of points and the curvature of the line at the top of the Sample box, you control whether colors fade slowly or dramatically.

cap) and offer only one corner type (bevel join). However, these programs let you color a line with a bitmap pattern for special visual effects, and let you end the lines with arrowheads. To its credit, FreeHand marries PostScript and QuickDraw functionality by offering bitmapped strokes and automatic arrowheads as well as caps and joins. However, only in Canvas and MacDraw Pro can you edit an arrowhead's shape and size independently of the line weight (see "Electronic Flint").

Canvas and its sibling UltraPaint provide a third pen option: *component line weight*. In both programs, a line may possess two thicknesses, one when it runs horizontally and another when it runs vertically. For example, if you were to draw an arc clockwise from 12 o'clock to 3 o'clock, the line might start out thin due to its horizontal weight component and become thicker and thicker as a result of its vertical component. The effect is much like that achieved by drawing with a calligraphic pen.

Changing Your Line

Almost no one draws what she or he really wants the first time, so a program's editing features are as important as its drawing features. There are two methods for editing an object: *reshaping* and *transforming*. To reshape an object is to edit the points and segments within a single shape. To transform an object is to manipulate the object as a whole.

All draw programs let you reshape free-form objects, such as Bézier curves and polygons. But DeskDraw and MacDraw Pro do not let you reshape geometric objects; so you can't, for example, change a circle into an apple or a rectangle into a folded page. This deficiency greatly reduces the utility of both programs. In FreeHand, Canvas, UltraPaint, and Michael's Draw, you may convert a geometric shape to a free-form object and then reshape it by dragging points and handles. Illustrator provides a special arrow tool to reshape a geometric object without first converting it. This same tool lets you manipulate objects that have been grouped with other objects, an editing capability shared only by FreeHand.

The big four transformation capabilities are resizing, flipping, rotating, and slanting. Illustrator and FreeHand provide a dedicated tool for each of these manipulations, while the other programs rely on commands. Such a tool provides greater control and flexibility because it can be used both to initiate the transformation and to define the origin point of the transformation. Illustrator and FreeHand also provide dialog boxes that let you perform any transformation numerically, like rotating in user-defined increments, which increases accuracy and

SELECTED DRAW FEATURES

	Adobe Illustrator 3.0.1	Aldus FreeHand 3.0	Canvas 3.0	DeskPaint & DeskDraw 3.03	MacDraw II 1.1v2	MacDraw Pro 1.0v1
	Adobe Systems	Aldus Corporation	Deneba Software	Zedcor	Claris Corporation	Claris Corporation
List price	$595	$595	$399	$199.95	$199	$399
Minimum system	Mac Plus, 2MB	Mac Plus, 2MB	Mac Plus, 1MB	Mac Plus, 1MB	Mac Plus, 1MB	Mac Plus, 1MB
GENERAL						
Import formats, editable	D	B	A,B,C,D,F,G,H,I	B	B	B
Import formats, for placement only	E	A,C,D,E	E	none	none	A,C,D,E
Export file formats	B,D	B,E	A,B,C,D,E,F,G,H,I	B	B	B,E
Maximum drawing size (in inches)	18 by 18	40 by 40	111 by 111	50 by 50	100 by 100	100 by 100
Color libraries (Pantone/custom)	●/●	●/●	●/●	○/●	○/○	●/●
OBJECT EDITING						
Number of geometric object tools	3	4	11	5	5	5
Shape creation (polygon/Bézier curves)	○/●	○/●	●/●	●/○	●/○	●/●
Geometric reshaping (objects/groups)	●/●	●/●	●/○	○/○	○/○	○/○
Cusp points (create/convert)	●/●	●/●	○/●	○/○	○/○	●/●
Points (join/split)	●/●	●/●	●/●	○/○	○/○	●/○
TRANSFORMING AND DUPLICATING						
Move (numerically/with arrow keys)	●/●	●/●	○/●	○/●	○/●	○/●
Scale by percentage (uniformly/nonuniformly)	●/●	●/●	●/●	●/○	○/○	●/○
Rotate numerically by degree	●	●	●	○	○	○
Skew/distortion/perspective	●/○/○	●/○/○	●/●/●	○/○/○	○/○/○	○/○/○
Series duplication	○	○	●	○	○	○
Publish and subscribe	○	○	●	○	○	○
FILLS AND OUTLINES						
Object blends (constant/accelerating/editable)	●/○/○	●/○/●	●/●/○	○/○/○	○/○/○	○/○/○
Gradient fills (linear/radial/custom origin)	○/○/○	●/●/○	●/●/●	○/○/○	○/○/○	●/●/●
Arrowheads (assign/edit)	○/○	●/○	●/●	●/○	●/●	●/●
Masking/hole-cutting	●/●	●/●	○/●	○/○	○/○	○/○
Patterns (bitmapped/tile)	○/●	●/●	●/○	●/○	●/○	●/○
Transfer modes	○	○	●	●	○	○
PRECISION DRAWING						
User-definable grids/guidelines/constraints	○/●/○	●/●/○	●/●/●	●/○/○	●/○/○	●/○/○
Measure (distance/angle/area)	●/●/○	●/●/○	●/●/●	○/○/○	●/●/○	●/●/○
Automatic measurement labels	○	○	●	○	●	●
Custom-scale rulers	○	○	●	○	●	●
Align (points/objects)	●/○	○/●	○/●	○/●	○/●	○/●
Layers (name/juggle)	○/○	●/●	●/●	○/○	●/●	●/●
Automatic chart creation	●	○	○	○	○	○
TEXT HANDLING						
Import text	J,K,L,N,O	○	○	○	○	J,L,M,N
Fit text to curve	●	●	●	○	○	○
Control text along curve (flip/move/orient)	●/●/○	○/○/●	○/○/○	○/○/○	○/○/○	○/○/○
Text positioning (kerning/baseline shift)	●/●	●/●	●/●	○/○	○/○	●/○
Text orientation (rotate/skew)	●/●	●/●	●/●	●/○	●/○	●/○
Convert text to graphics (PostScript/TrueType)	●/○	●/○	●/●	○/○	○/○	○/○
BITMAP EDITING						
Pixel editing/color control	○/○	○/●	●/●	●*/●*	○/○	○/●
Automatic bitmap tracing	●	●	●	●*	○	○
OUTPUT CONTROL						
Halftone control (resolution/line frequency)	●/●	●/●	●/●	○/○	○/○	○/○
Prints color separations	●**	●	●	○	●	○

*● = yes; ○ = no. * With DeskPaint. ** Requires separate Adobe Separator product.*

A = MacPaint; B = PICT; C = TIFF; D = Illustrator EPS; E = other EPS; F = start-up screen; G= CGM; H = DXF; I = IGES; J = ASCII; K = RTF; L = MS Word 4.0; M = MacWrite;

Michael's Draw 1.0	UltraPaint 1.1
Event One	Deneba Software
$149.99	$199
Mac Plus, 1MB	Mac Plus, 1MB
B	A,B,C,F
A,D,E	none
B,D	A,B,C,F
168 by 168	107 by 107
○/●	○/●
6	8
●/○	●/●
●/○	●/○
○/○	○/●
●/●	●/●
○/●	○/●
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○/○/●	○/○/○
●/○	○/○
●/○	●/●
○/○	○/○
○/●	●/●
○	●
○/○	○/○
○	○

N = MacWrite II; O = WriteNow.

control. Other programs let you resize—or in the case of Canvas and UltraPaint, rotate objects—numerically, but they have poor support for other transformation features.

Type Casting

To an artist, text is just another graphic object. Unfortunately, some programmers seem to be unaware of this fact. MacDraw Pro lets you import text, check the spelling, and position tab stops with a text ruler. All of this makes it a decent mini–word processor, but MacDraw Pro, like DeskDraw, provides little in the way of special effects, letting you rotate text but not condense, expand, or slant it. Because many users rely on draw programs to create logos and other display copy, these oversights in DeskDraw and MacDraw Pro border on intolerable.

Without a doubt, the best text wranglers are Illustrator and Canvas. Both programs let you join text to a curve and wrap text inside or around a shape. In Illustrator, you can flow text between columns as in a page-layout program. Only Michael's Draw shares this helpful feature, although its implementation is less intuitive. Canvas provides the spelling checker and tab-stop ruler found in MacDraw and adds a search-and-replace function (all of which Illustrator lacks).

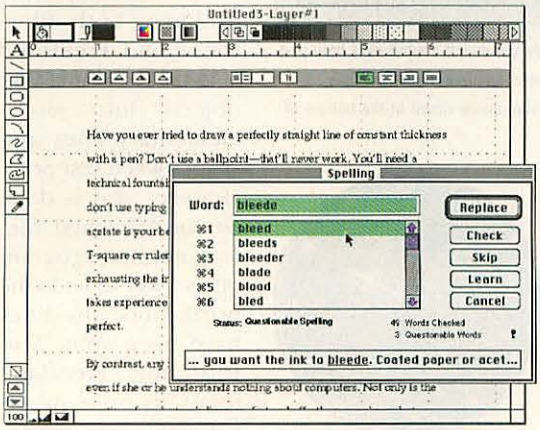
But the ultimate text feature shared by the two programs is a boon to artists of all varieties: Canvas and Illustrator can convert selected characters to reshapable outlines. For example, you might convert the letter *A* to an outline complete with points, segments, and adjustable control handles. Canvas converts characters set in either a PostScript or TrueType font; Illustrator converts only Type 1 PostScript fonts. (Canvas's TrueType support is indicative of the fact that it is the only program here that is System 7–savvy, not merely compatible. Illustrator 3.2, which was in beta when this article was written, adds TrueType and is System 7–savvy.)

FreeHand also lets you convert text to graphic outlines and join text to a curve. For this latter feature, it offers a unique extra: text may be joined to both the top and bottom halves of a circle. But FreeHand lacks many of the noteworthy functions provided by Illustrator and Canvas, like multicolumn text flow and a spelling checker. FreeHand also requires that you fill and stroke text through an array of sometimes confusing dialog-box options.

Power over Pixels

It's a myth that illustration programs inherently perform at a higher level of sophistication than standard draw programs. This is especially true for bitmaps. Canvas, DeskDraw, Michael's Draw, and UltraPaint each provides a level of bitmap handling superior to any PostScript-based illustration program. Although FreeHand lets you adjust the overall brightness and contrast of an imported gray-scale TIFF image, Canvas, UltraPaint, and Desk-Draw let you edit a bitmap pixel by pixel. UltraPaint provides a variety of image-editing options, similar to those found in a dedicated paint program.

Michael's Draw provides an altogether different emphasis. Although it does not let you edit a bitmap, you can export a drawing as a bitmapped PICT document for editing in some other application. You can also soften images with an antialias filter; this is especially useful when creating slides or



Multiple Personalities MacDraw Pro provides few high-end drawing features. Instead, this new version adds word processing features, like a spelling checker, tab rulers, and the ability to open MacWrite and Microsoft Word files.

color screen images, whose jagged edges are more apparent because of lower resolution.

Stopping the Show

While today's programs let you make a drawing as complicated as you desire, getting that drawing to print can be a very different matter. Over the years, both printers and draw programs have improved, but printing errors are still common.

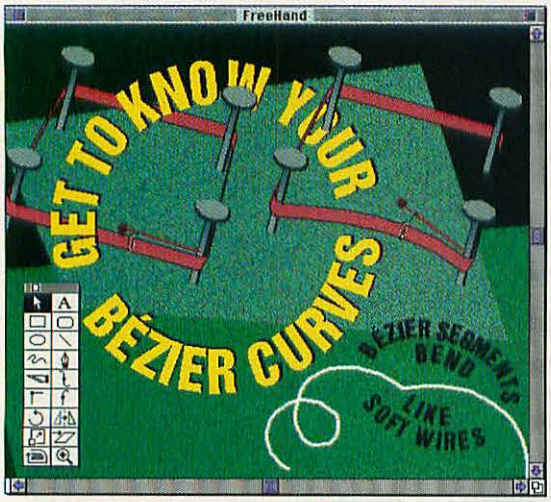
First, there's the issue that what you see may bear only slim resemblance to what you get. The primary culprit is the QuickDraw/PostScript language barrier. Because the overwhelming majority of high-resolution, film-based output devices use PostScript, QuickDraw-based graphics programs frequently encounter problems during the output stage.

Some QuickDraw routines simply do not translate to PostScript printers. Among these routines are *transfer modes*—options that cause colors in overlapping objects to blend with each other and options that give components a 0-point weight. Both modes are included with Canvas and UltraPaint. Transfer modes also make up many of the special scripting routines in Michael's Draw.

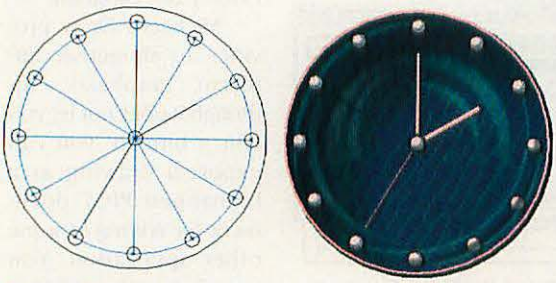
More dangerous are the QuickDraw routines that do translate to PostScript, but not always successfully. Line endpoints may appear squared off rather than perpendicularly sliced; corners of polygons made up of segments with different weights may not join correctly; arrowheads may not accurately align to their line segments. The result is an imperfect drawing whose defects are enhanced by the crystal-clear resolution of the output device.

A PostScript program, such as Illustrator or FreeHand, prints more reliably to a PostScript printer. But there are no guarantees. Both Illustrator and FreeHand offer several complex fill effects that can defy the capacity of a device to print. If a complex object is filled with a tile pattern or masks other objects, your printer may have too little memory to interpret the drawing, resulting in a *limitcheck* error.

To remedy this problem, both Illustrator and FreeHand automatically break up objects into more-elementary lines and shapes when you print. However, this is done to your finished file, and neither program offers a way to undo the break once the lines have been split. Also frustrating, FreeHand tends to print its error messages rather than display them on screen, wasting valuable film and processing time.



The Right Circles FreeHand 3.0 gives you much control over how text fits to a curve. By combining two ellipses, you can have text flow around a circle or an oval without turning upside-down at the bottom of the curve.



Custom Guides Illustrator 3.0 lets you convert objects into guidelines. Shown at left in blue, these guidelines let you create highly accurate lines and shapes, demonstrated by the black outlines. The finished image (right) conforms to the custom guides while appearing to be free-form.

The Also-Rans

Several programs lack a sufficient range of features to satisfy some basic drawing requirements. The DeskDraw/DeskPaint bundle is undoubtedly the weakest of the bunch, suited only for occasional users. DeskDraw 3.03 sports a feature list virtually identical to that of the first MacDraw of six years ago. Admittedly, DeskDraw's features are scaled down to make it small enough to function as a desk accessory, but with the growing popularity of System 7 and computers with 4MB of RAM, the need for such quasi-applications has all but evaporated.

UltraPaint offers the best painting tools of the seven programs featured here. But its image-editing capabilities are a far cry from those of a low-end retouching program like Aldus Digital Darkroom; and UltraPaint's painting tools are only barely better than those offered by Canvas, which far outclasses UltraPaint in all other respects.

Then there's the unquestionably mislabeled MacDraw Pro—it's not for professional artists. It offers a solid range of low-end slide-making, text-editing, and graphics-creation capabilities. This shallow array of integrated features is perfect for the new or moderately experienced user, but its $399 price puts it in the same market as professional draw programs, against which it is slow and deficient. Business-oriented users will get the most out of its presentation and basic draw features. But for the same price you can get Canvas, which offers the same types of features, plus precision drawing, reshaping, duplication, and transformation. If you don't need that kind of power, MacDraw II for $199 is a better bet.

Of the draw programs surveyed here, Michael's Draw is the hardest to quantify. As a straight draw program, it offers a basic collection of features with a few high points (text on a curve) and a few disappointments (no Bézier curves). Its interface is bizarre enough to keep you running for the manual. Still, it offers a tidy assortment of distinctive organizational features—up to 8000 namable view sizes, 8000 drawing layers, precise control over application memory, and the ability to group documents into pro-

CONTROLLED DRAWING

Just because you're not an architect or an engineer doesn't mean you don't need a controlled interface. Illustrators don't spend all of their time drawing free-form flowers and other naturalistic forms. Sometimes you need some rulers, grids, and constraints to go with your Bézier curves. You need a drawing program to be more than a blank canvas.

Typically, control features fall into one of two categories: *grids* and *alignment*. A grid is a network of regularly spaced horizontal and vertical boundaries that force the cursor to move by prescribed increments. Grid boundaries typically appear on screen as dotted lines. Of all the programs reviewed, FreeHand provides the most versatile grids, letting you specify the actual boundaries and the displayed boundaries of the grid independently.

A variation on the grid is the guideline—provided by FreeHand, Canvas, and Illustrator—which is a user-defined grid boundary created by dragging from the ruler bar. The best guidelines are found in Illustrator (the only program that lacks regular grids), in which any object may be converted to a guideline, letting you create images that follow a specific shape or angle.

To align two or more objects is to adjust their locations according to a desired formation. For example, you might arrange a series of rectangles so their bottom edges line up along a horizontal axis, resulting in a bar graph. FreeHand, Canvas, MacDraw Pro, and Michael's Draw also offer a distribution option, which spaces objects evenly between two horizontal and/or vertical boundaries.

Again, Illustrator is the odd program out. It is the only draw program that offers a dedicated graphing feature, but it does not let you align whole objects. Instead, Illustrator has an Average command that works on individual points, whether in separate objects or components of a single object. Only the beta version of CA-Cricket Draw III provides alignment features that work on both whole objects and individual points.

But of all the draw programs available on the Mac, Canvas is the one that really packs the control features. In addition to providing several specialized tools for drawing three-dimensional boxes, equilateral polygons, custom grids, and so on, Canvas provides 15 tools that measure and automatically label an object according to its length, angle, radius, or diameter. You can also create labels that describe a shape's height, width, perimeter, and area. Finally, you can develop a system of custom constraints using Canvas 3.0's smart-mouse feature. A smart-mouse constraint might control the specific angle of a drag, the length of a line, or whether the cursor aligns to points and segments in existing objects (see "Canvas 3.0," *Reviews,* in this issue).

Canvas 3.0 is the best example of a program that has made dramatic strides toward closing the gap between the worlds of free-form illustration and precision drawing. Most artists need a combination of both capabilities. I hope it won't be long before true PostScript programs such as Illustrator and FreeHand join actively in this trend.

jects. Also, you can do unusual tricks, like coloring the first letter in a word green, the last letter black, and then filling the remaining letters with discrete, incremental shades between the two. Michael's Draw is one of the quirkiest programs I've ever seen, but for the multimedia enthusiast who dabbles freely in both the bitmapped and object-oriented environments, its low price makes it an interesting—but not essential—addition to your software collection (see *Macworld, Reviews,* December 1991).

MW EDITORS' CHOICE

PostScript programs print the best, but a QuickDraw program fares better when integrating bitmaps, creating labels, and designing artwork that you want to transfer to another application via the Clipboard. That's why any serious artist should own at least one program of each type. This may sound excessive considering the average income of a commercial artist, but it really is the ideal.

I recommend Illustrator and Canvas. Both provide superb text handling, adept transformation and reshaping capabilities, and gobs of features found in no other Mac drawing application. Illustrator, for example, automatically kerns text that has been joined to a curve, to avoid overlapping or splayed character pairs. It also offers tools for creating bar and line graphs based on entered or imported numerical data. Canvas lets you select objects according to their fill and pen attributes. You can also combine objects to simulate masking and hole-cutting effects. But best of all, Canvas provides an array of optional tools to structure the drawing environment (see "Controlled Drawing").

If you're strapped for cash or simply don't want the hassle of learning two very different programs, FreeHand almost measures up as a compromise choice. It would be top-notch if only more thought had been given to improving its capabilities. For example, although FreeHand bridges the gap between PostScript and QuickDraw programs by offering bitmapped fill patterns, TIFF-import and color-balance capabilities, and automated arrowheads—all of which are missing from Illustrator—every one of these features is implemented incompletely. Bitmapped patterns cannot be tinted or separated as process colors for traditional printing. FreeHand's color-balance features work only on gray-scale TIFF images; color bitmaps can be separated but not balanced; and bitmaps cannot be edited. And arrowheads in FreeHand cannot be customized. This may sound like nit-picking, but these flaws represent dozens of similar inadequacies. Although many people love FreeHand, I suggest you wait at least until version 4.0 comes out and buy Illustrator and Canvas in the meantime. ■

See *Where to Buy* for contact information.

Deke McClelland *is a writer based in Boulder, Colorado. In addition to* Drawing on the Macintosh *(Business One Irwin, 1990), he has written books about his three favorite draw applications:* Canvas 3.0: The Book *(Peachpit Press, 1991),* Mastering Adobe Illustrator, Macintosh Version 3.0, *and* Mastering Aldus FreeHand, Macintosh Version 3.0 *(both from Business One Irwin, 1991).*


C
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all about

COLOR

The keys to choosing color tools for predictable, high-quality results

Color has always presented a contradiction to Macintosh culture: what you see on the screen is not what you get on the page. Sometimes it's not even close. And what you see on a page to be scanned looks very different on screen. The brilliant fire-engine red on a monitor may become weak and faded from a color printer, purplish and distorted from a slide recorder.

This happens, first, because different devices vary widely in how they represent color. A monitor displays colors by lighting up phosphors on screen (and those phosphors vary across monitor brands, different units of the same brand, or even the same monitor as it ages). Color printers place patterns of color dots on paper, while printing presses lay down overlapping tints of ink, and slide recorders expose color film. These different technologies simply can't produce the same range of colors.

Second, color correspondence is complicated by variations among color models (conceptual systems for specifying colors numerically) used by different programs and devices. Displays and slide recorders use red-green-blue (RGB); printing presses and most color printers use cyan-magenta-yellow-black (CMYK); and software packages support several other color models.

Color Solutions

The best way to achieve predictable color today is to combine calibrated monitors, swatch books, and a working knowledge of color models. A swatch book—sample colors produced on a final-output device—shows you what colors are available and helps you choose among them (see "Swatch Out").

Calibration systems help ensure that the image displayed on a monitor looks similar to that on another monitor down the hall. These hardware-software combinations (for example, from RasterOps, SuperMac Technology, Kodak, and Radius) fine-tune the display to provide consistent colors, and can also be used—within limits—to simulate output from other devices, such as color printers. (For more on calibration, see *State of the Mac,* February 1991.)

Color models can clarify differences in hue, saturation, and brightness. Software helps sort out color-model differences, and swatch books show what colors can then actually be produced. But this can be a time-consuming, trial-and-error process that yields disappointing results. This article sorts out the most important color models and offers suggestions about how to get effective output with the least aggravation.

Then it describes some developments that represent future solutions to the challenges of color—new standards that describe the way the human eye perceives color, rather than the components that make up that color. (PostScript Level 2 is at the heart of these new systems, as are the new system-level color-management tools being developed by Apple.)

The makers of these systems say that they will provide the Holy Grail of computer color—*device-independent color*—whereby every color you specify will come out the same on any device. The promise of device-independent color is overblown. But as these systems approach that lofty goal, they will go a long way toward eliminating the trial and error we endure today.

Life in Red, Green, and Blue

The most familiar color model for most Mac users is RGB (see "Creating Colors by Adding or Subtracting"). It's the model used to display images on the screen and to choose system colors from the Control Panel using the Apple Color Picker. Almost every color program lets you specify colors using RGB values. Most color scanners and slide recorders use RGB, and almost every wax transfer and dot matrix

by Steve Roth

ERIC ADIGARD/MAD

color printer for the Mac can work in RGB mode. (The other common mode for color printers is CMYK, discussed below.)

RGB's first cousin is HSB (hue-saturation-brightness), also called HLS (hue-lightness-saturation) or HVC (hue-value-chroma). It's a simple arithmetical transformation of RGB, as you can see by playing with the numbers and watching them change in the Apple Color Picker.

Many designers specify changes by saying "a little lighter," "add some red," or "saturate it a bit more," all easily implemented from the Color Picker. RGB and HSB are self-evident color models that can be used with little training. And since they're used in such a wide variety of Mac software and hardware, they're natural methods for specifying colors for on-screen display, multimedia, and slide-recorder and color-printer output.

Just because all these devices use RGB, however, doesn't mean that a given color specification will come out looking the same on all of them. At present, the only way to get that kind of predictability is to create a custom swatch book using your final-output device, then refer to that swatch book when choosing colors.



ROBIN GINSBERG

Swatch Out Swatch books show what specified colors look like off press. Counterclockwise, beginning at top left, Graphics Master, 4th ed., is a general-purpose print-production tool with a small collection of swatches. Computer Color shows 10,000 process-color swatches created with Adobe Illustrator and Adobe Separator. The Trumatch Colorfinder is the up-and-coming process color swatch system. The Pantone Process Color System Guide is a set of numbered process colors. The Pantone Process Color Imaging Guide, CMYK Edition, shows side-by-side swatches of Pantone colors—printed with the Pantone ink on the right and the CMYK equivalent on the left. (You probably can't see it in this picture because it's printed with process colors, but the CMYK approximations differ sharply from the Pantone inks.) Trumatch and Pantone are fighting it out over which will become the process-swatch standard among U.S. designers and printers. Pantone has more colors and is the leading supplier of spot colors; but the Trumatch books are better organized—each color on a card is an equal amount lighter than its predecessor. This makes it easier to specify smooth gradations of color. Both work well, so in general, use whichever your printer uses.

Printing Spot Colors

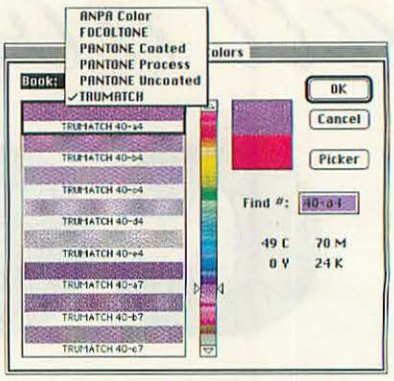
When it comes to printing—as in using a printing press—the easiest way to get color off the Mac is to use spot colors, usually via two or three layers that you print out on separate sheets. When you print those *overlays,* each with a different color, on top of each other, you achieve a multicolor image.

Almost every print shop in the United States uses Letraset's Pantone Matching System (PMS). This system of named, numbered colors makes it easy to specify a spot color from the Pantone swatch book—"Give me PMS 161." Most important, printers can create accurate ink colors by using PMS specifications.

The high-end page-layout and graphics programs that support spot-color overlays (including QuarkXPress, Aldus PageMaker and FreeHand, Letraset's DesignStudio, and Adobe Illustrator and Separator) all make it easy to select Pantone colors, and all support the Pantone Professional Color Toolkit—software for helping various devices work together in a step toward device-independent color (see "Directions in Device-Independent Color").

If your program can produce spot-color overlays but doesn't have a Pantone specification system, you can still apply spot colors to items and print them on separate overlays. (All the overlays come out black, anyway. Colors only appear when the overlays are printed with color inks.)

Whether or not your program supports the Pantone model directly, get a printed Pantone swatch book; the on-screen display of Pantone colors is simply not reliable. This is especially true with the unusual colors that are among the best reasons to use Pantone inks. No monitor or color printer can produce the beautiful metallics, dazzling fluorescents, and creamy, rich turquoise that you can achieve with Pantone inks.



Choosing a Color Book Some programs (such as Photoshop 2.0, shown here) offer several printing color models from which you can choose. Any program that supports the Pantone Professional Color Toolkit (including the most recent versions of Letraset's LetraStudio and ReadySetGo; DesignStudio; Canvas; Photoshop; and QuarkXPress) gives you access to the Pantone "books." Photoshop and QuarkXPress are among the few that also support Trumatch and Focoltone.

Finally, a number of Pantone-approved color printers have emerged, which produce Pantone colors within Letraset's specifications. They can't portray Pantone colors with complete accuracy, however, because Pantone inks are mixed colors, while desktop printers configure CMYK or RGB colors in various patterns that take on the appearance of mixed colors.

Printing Process Colors

Spot colors are fine, but you can't use them to reproduce photographs or to achieve the range of colors you see in a glossy magazine. For that kind of work, turn to four-color process printing using the process inks—cyan, magenta, yellow, and black.

By overlapping different tint percentages of the four process inks, you can produce thousands of colors. Printing presses use the CMYK model, most color printers (especially expensive ones) use it as their mode of choice, and it's the preferred method in print-oriented programs like Illustrator and FreeHand.

As with spot colors, you can't rely on a display for choosing process

colors. You must have printed samples of CMYK colors, either a customized collection or from a swatch book. You can specify CMYK colors easily in illustration and page-layout programs like Illustrator, FreeHand, Deneba's Canvas, PageMaker, and QuarkXPress—either click on a color in CMYK mode, or type in the CMYK specifications (obtained from your swatch book).

The latest versions of advanced color image-editing programs (Adobe Photoshop and Letraset's ColorStudio) also allow conversion of RGB scans to CMYK mode and editing of full-color images in CMYK. This is a big step forward, allowing you to view and make corrections on the actual CMYK values that will be printed, rather than on RGB values that must be converted to CMYK. The display still won't tell the truth, but at least you can refer to your swatch book to ground yourself in printed reality.

Process-Color Swatch Systems

Beware, though. Even if you're looking at printed CMYK swatches when specifying process colors, the same CMYK specifications on two different jobs may result in very different colors due to variations in press settings and ink and paper brands. A new group of process-color swatch systems—including Focoltone (used primarily in Europe) and Trumatch, by companies of the same names, and Pantone's Process Color System—address this consistency problem.

Each of those systems is based on printed swatch books, one on coated stock and one on uncoated stock, with numbered process-color combinations. If you ask for Trumatch 39-a4 (composed of 77C-100M-0Y-24K), for instance, you and your printer can look at swatch books and know you're talking about the same color. The printer can adjust the press to get as close to the desired swatch as possible. Colors are specified through software that supports one or more of these systems (see "Choosing a Color Book").

Device-Independent Color

Getting swatch systems to work properly, coordinating color models and various devices—it's a headache, to say the least. That's why the future of Macintosh color—at least for the majority of users who don't require precise color matching—lies in new color-management systems that use perception-based, device-independent color standards.

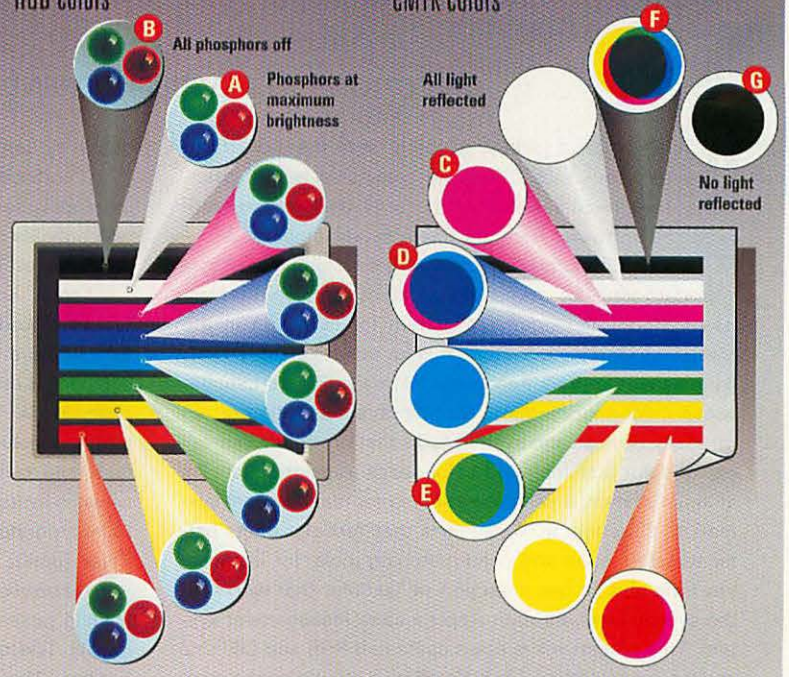
These systems are designed to deliver a common color-description language that can be understood by all devices. Their goal is to allow you to specify a color on your display, and to get the same color (or as close an approximation as possible) effortlessly from a color printer, slide recorder, or offset-printing press.

The new color models go by various cryptic names, such as Calibrated RGB, PhotoYCC, CIELuv, CIE XYZ, and half a dozen others. All are based on the standards developed by CIE (Commission Internationale de L'Eclairage) in 1933. This group defined a three-dimensional color space that mapped all visible colors to mathematical values (see "Describing Color"). The variations on that original standard differ mathematically, but they all describe the color you're *seeing*, rather than the components that make up the color.

Color-Space Concepts

Four concepts are central to understanding perception-based *color spaces*—systems for defining and describing colors—and their implementation on the Mac: gamut, char-

Creating Colors by Adding or Subtracting



The light-based RGB model (above left), used with monitors, is additive. Monitor phosphors are red, green, or blue. When all three colors are illuminated at maximum brightness in a given section of the screen, you perceive a white pixel (**A**); when all three are turned off, you see a black pixel (**B**). Between those extremes, any color can be shown by varying the percentage of red, green, and blue that combine to create each pixel.

CMYK, a primary model for the printed page, is subtractive—light is absorbed, or subtracted, by cyan, magenta, and yellow ink. In process-color printing (above right) layers of translucent inks are used, each subtracting certain colors of light. Colors that are not absorbed pass through to the paper below, which reflects all colors. For example, magenta ink looks magenta because it allows magenta light to pass through but absorbs all other colors (**C**). Blue, composed of magenta and cyan ink, lets only those two colors of light through (**D**). Green, composed of yellow and cyan ink, lets only those colors through (**E**).

In theory, 100 percent each of cyan, magenta, and yellow produce black—all colors of light are subtracted, none reflected. In practice, however, cyan, magenta, and yellow inks are not pure, and when layered they create a muddy color (**F**). Printers add a dedicated black ink to achieve pure black (**G**).

DIRECTIONS IN DEVICE-INDEPENDENT COLOR

There's a lot of jockeying going on in the industry to determine which CIE-based color spaces and color-management systems will become standards in hardware and software. Here are the latest developments.

Apple. Not surprisingly, Apple is developing the most important tools for device-independent color on the Mac. Its new color-management system for inclusion in the Macintosh Operating System, due for release in early 1992, handles all the tasks necessary for managing perception-based color spaces. It will include characterization tables for many devices and system tools that programs can call on for color matching and color-space transformation. As an open system, it will allow other color-management systems to plug right in. If you think that TekColor offers better transformation and color-matching tools, for instance, you'll be able to use a version of TekColor that works on the system level, through Apple's color-management system. This system will support calibrated RGB and CIE XYZ spaces, among others. Apple's offering should be the most widely applicable color-management solution.

Adobe. PostScript Level 2 has a sophisticated color-management engine that understands and transforms most color spaces sent to it by applications. PostScript devices (such as the first color printers incorporating Level 2, the Tektronix Phaser II PXi and III PXi) include their own characterization tables, so they can handle color matching as well. Since the final goal of much color matching is to produce output on color printers and slide recorders, PostScript Level 2 should become an essential ingredient in the device-independent color mix.

Adobe has also stepped toward device-independent color with Photoshop 2.0. You can specify which monitor you're using, then adjust its gamma, white point, ambient light, and phosphor colors. Photoshop also adjusts color-printer output to match the display image more closely.

Letraset and Pantone. The Pantone Professional Color Toolkit, a free utility developed and distributed by Letraset and Radius, is a Control Panel item that includes RGB, CMYK, and CIE values for each of the Pantone colors, and any program that supports the Toolkit can access those values. The Toolkit also contains characterizations of a number of devices, so in conjunction with programs that support it, it can adjust the display and the color-printer output to depict Pantone colors more accurately.

ColorStudio 1.5, Letraset's flagship color image-editing application, comes bundled with ColorCalibrator 1.5, which builds printer-characterization files and helps ColorStudio adjust output to match display colors more closely.

Kodak. Kodak's PhotoYCC color model was developed for use in Kodak's new PhotoCD (a system that can transfer data from film to a CD for display on a television). The company is extending PhotoYCC into other computer-based areas. Kodak has also released a color-management system that includes programming tools, utilities, device profiles, and calibration hardware and software. Current licensees include QMS, RasterOps, and Radius, which plans to incorporate portions of the system into the Professional Color ToolKit.

Tektronix. A couple of years ago, Tektronix took a leading position in device-independent color by introducing its TekColor system for use with QuickDraw color printers. The system consists of software algorithms for transformation between color spaces, a color picker that replaces Apple's, and characterization files (Tektronix Color Device Files, or TCDFs) that describe the gamuts of several devices. The recently released TekColorPS extends the system to PostScript Level 2 output devices.

Unfortunately, Tektronix has only created TCDFs for its own printers. This weak implementation of well-conceived technology would leave the TekColor system on the sidelines except for the work of two TekColor licensees, SuperMac Technology and Savatar.

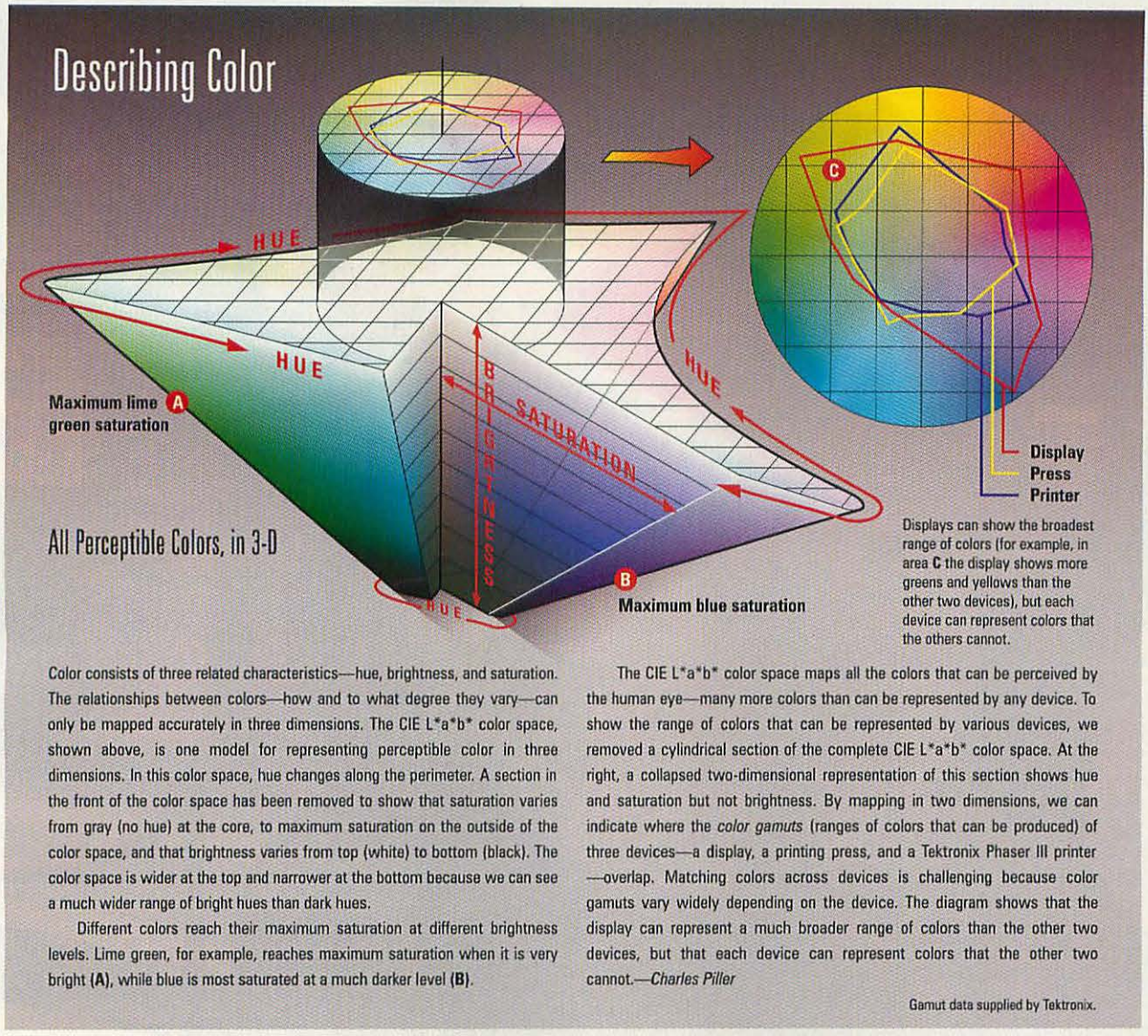
SuperMac sells TekColor, along with a monitor-calibration device that creates TCDFs, under the name SuperMatch. Using the monitor characterization created by the calibrator, SuperMatch adjusts the display to simulate the appearance of output from various output devices, including printed color under various lighting conditions. Savatar's ScanMatch is a TekColor-based system for calibrating color-scanner input. Savatar is also building TCDFs for printers, in hopes of licensing them to the printer manufacturers.

RasterOps. RasterOps will soon release a 32-bit board that enables you to open a window that displays CMYK data—allowing a side-by-side comparison of equivalent RGB and CMYK values on your monitor.

acterization, color matching, and transformation.

Every device has a *gamut*—a range of colors it can produce. Within that gamut, the device's color space may not be uniform between hues; the device may be able to produce a much greater number of distinctly different blues, for instance, than reds. The description of a device's gamut is its *characterization*, which can take many forms, depending on the color-management software being used. With a characterized device, you can feed in a given set of values (RGB or HSB specifications, for instance) and know what color will come out.

Color matching is the process of converting color values to colors that a device can actually create. You might be looking at a beautiful azure sky on your display that your color printer can never hope to reproduce. Color-management software can map that blue to the printer's closest available blue. But color matching is not an exact science. One color-management system might map that out-of-gamut blue to a green that is mathematically close to your chosen color



Displays can show the broadest range of colors (for example, in area **C** the display shows more greens and yellows than the other two devices), but each device can represent colors that the others cannot.

Color consists of three related characteristics—hue, brightness, and saturation. The relationships between colors—how and to what degree they vary—can only be mapped accurately in three dimensions. The CIE L*a*b* color space, shown above, is one model for representing perceptible color in three dimensions. In this color space, hue changes along the perimeter. A section in the front of the color space has been removed to show that saturation varies from gray (no hue) at the core, to maximum saturation on the outside of the color space, and that brightness varies from top (white) to bottom (black). The color space is wider at the top and narrower at the bottom because we can see a much wider range of bright hues than dark hues.

Different colors reach their maximum saturation at different brightness levels. Lime green, for example, reaches maximum saturation when it is very bright **(A)**, while blue is most saturated at a much darker level **(B)**.

The CIE L*a*b* color space maps all the colors that can be perceived by the human eye—many more colors than can be represented by any device. To show the range of colors that can be represented by various devices, we removed a cylindrical section of the complete CIE L*a*b* color space. At the right, a collapsed two-dimensional representation of this section shows hue and saturation but not brightness. By mapping in two dimensions, we can indicate where the *color gamuts* (ranges of colors that can be produced) of three devices—a display, a printing press, and a Tektronix Phaser III printer—overlap. Matching colors across devices is challenging because color gamuts vary widely depending on the device. The diagram shows that the display can represent a much broader range of colors than the other two devices, but that each device can represent colors that the other two cannot.—*Charles Piller*

Gamut data supplied by Tektronix.

but looks unnatural. Another might map it to a purplish blue that isn't as close mathematically but more closely resembles the sky on your display.

With so many color models, colors specified in one color space will inevitably need to be converted to another. That process, *transformation,* often takes place at the same time as color matching. When you send RGB values to a printer, for instance, they might be converted to CMYK and simultaneously mapped to the device's color gamut.

Coming to Agreement

Device-independent color systems will eventually combine and manage those four critical components of color truth and quality. What's missing, then? The standard. One manufacturer's baby bottle doesn't work with the other manufacturer's rubber nipples. While several potential standards exist (at least one—TekColor by Tektronics—is already available), nothing comes close to a universal standard supported by every printer, monitor, and scanner manufacturer and software developer. The few devices that have been characterized work with only one or two of the existing systems. Apple's new color-management system might provide a solution, but until everyone agrees on a system and supports it, true device-independent color will remain on the horizon rather than the desktop.

In the meantime, however, whatever color system you use, a central piece of advice remains the same: think backward. Decide on the final-output device first; then find the color models, swatch systems, and techniques that work best for that device. Until the machines can do all the work, following that simple rule can take you a long way toward achieving high-quality, predictable color. ■

See *Where to Buy* for contact information.

Macworld *contributing editor* ***Steve Roth*** *is coauthor of* Real World PageMaker 4 *(Bantam Computer Books, 1991) and editor of* Real World PostScript *(Addison-Wesley, 1988),* Real World FreeHand, *and* The QuarkXPress Book *(both Peachpit Press, 1991).*





JIM LUDTKE

The 1991 Macintosh GAME HALL of FAME

It's been a contentious year for the Macintosh Game Hall of Fame. In addition to the usual minor spats over fine points of digital gamesmanship, a grand controversy emerged: should we merge with the IBM PC–Compatible Game Hall of Fame? Some of our board members salivated at the prospect, coveting the superior resources of that well-heeled institution, and also access to the thousands of non-Mac games that become eligible each year. After long and heated debate, the director (and, let's face it, dictator) of the Macintosh Game Hall of Fame—yours truly—made an impassioned speech against the proposal. "Sure," I said, "there are a lot more games written for them than for us. But our games are

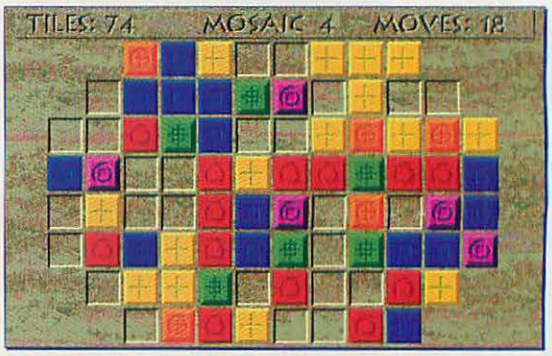
by Steven Levy



Paper Tiger Now, how are we going to get this toy airplane across the room? With Glider, you've got to figure it out.



It's a Dirty War A sample of Armor Alley action. While the tanks blast and the 'copters attack, the real action lies with the paratroopers.



The Big Mosaic Thinking ahead is not everything in Tesserae, where careful planning rids you of tiles. You've got to be smart.

better. Just look at some of this year's selections—I don't think we've ever had a more impressive or deliciously addictive list of inductees.

"Besides, even with a panel of dedicated nominators spotting potential winners throughout the year, our annual retreat to the Electronic Cottage of Solitude is fraught with agonizing dilemmas. I'm convinced the Macintosh platform provides us with plenty of games.

"Finally, need I remind you, a merger would mean buying an IBM PC clone. You don't want that, do you?"

Of course no one did. In retrospect, it's amazing we considered it—it would be as crazy as Apple itself cutting a deal with IBM.

That over, let's get down to business. We are pleased to announce that our 1991 Macintosh Game Hall of Fame is jam-packed with distinguished products. We were able to identify a clear winner in every category (except in the Simulation category where there was a tie), and we added CD ROM games to the roster. This year's inductees, like their predecessors, may broadcast their winning status with official Macintosh Game Hall of Fame stickers on their packages.

Best Arcade Game: Glider 4.0

Casady & Greene. Requires: Mac Plus; System 6.0.2. $49.95.

Most arcade games have arcane enemies who exist as targets for you to pulverize—things like spaceships, boulders, and huge autonomous bloodshot eyes. Glider has a different foe: gravity. You are in command of one of the least sexy vehicles ever to star in an arcade game—a paper airplane. Instead of outer space or a war zone, the location is a plain old house, albeit a rambling one with lots of rooms and several floors. There is seemingly nowhere to go but down, but you stay aloft or rise to an upper floor by catching updrafts from the extensive heating vents (the energy bill in this place must be astronomical). If you hit a piece of furniture or one of the passing obstacles you might encounter, you crumple and the computer emits a digitized sigh (which soon becomes a maddening sound). With the exception of an occasional, not to mention illogical, charge you get from passing by a battery, you have no thrusting power. The closest thing to a weapon is a rubber band. I mean, the testosterone level here doesn't register on the charts. Yet Glider is beguiling, addictive. In the spirit of classics like Dark Castle, each room provides a different challenge, in which you must figure out how to maneuver your glider past domestic perils and into the next room. It would be madness if you were not permitted to save the game, but you are. It would be extra nice if you had the option of designing your own house of horrors as a backdrop for the gliders, and you do have the option. No copy protection, either. Glider, formerly a legendary shareware game, has soared to new heights in its commercial incarnation.

Best Strategy Game: Armor Alley

Three Sixty. Requires: Mac Plus. $49.95.

If you are a would-be Pentagon strategist, or an armchair Civil War buff who spends weekends pushing around markers on a sandbox jury-rigged to simulate Antietam, forget this one. This is a war game with grit under its fingernails and shrapnel in its lungs, kind of a Sergeant Rock comic come to life. The idea is simple: assemble a convoy of war matériel to proceed along a linear path to the headquarters of your opponent, and then blow the headquarters up. At the same time, this opponent—either the computer, or a friend who is as wacky as you are—tries to do the same thing to you. (It is doubtful whether any of your friends is as tough as the computer here, which makes Norman Schwarzkopf look like Tony Randall.) Though you are sort of a purchasing officer, with the ability to order jeeps and paratroopers to the limits of your (limited) budget, you also get to control a helicopter—to protect your guys and wipe out the other guys, and to dodge the enemy helicopter. It plays better than it sounds, mainly because there are ten levels of play, each requiring a higher degree of hand-eye coordination and a willingness to experiment in innovative strat-

egies. Players of Armor Alley have formed secret cults through which they exchange secrets pertaining to various levels of play. If you finish level ten on this game, several things can be said about you: you are persistent, cunning, ruthless, fast with your fingers, and behind on everything else happening in your life. Call home.

Strategy Game Runner-Up: Harpoon
Three Sixty. Requires: Mac Plus; System 6.0.2, 640 by 480 monitor for color. $59.95.

An electronic submarine techno-thriller in the spirit of Tom Clancy, whose comments on the subs in question are included in the detailed documentation.

Best Brain Game: Tesserae
Inline Design. Requires: Mac Plus; Mac LC for color; System 6.0.5. $49.95.

My dictionary tells me that tesserae are "the small squares of stone or glass used in making mosaic patterns." The esoteric term derives from the Greek *tessares,* or square. Considering the surprising number of tile-based Mac games entering the market lately, one wonders whether mosaic is getting prosaic. But Tesserae demonstrates that there's life beyond Shanghai and Ishido: The Way of Stones. Though the rules at first come at you in a confusing blitz—there are eight different kinds of moves—the play here is actually quite simple, once you get the hang of it. Basically, you move by jumping tiles, removing them from the gridlike board, and manipulating things so only a single tile remains. The main complication is that there can be as many as three tiles on a space, shown not in three-dimensional style but by superimposing the tile patterns to create an increasingly complex ideogram. So certain jumps might remove only the top tile on a stack. And if you have a tertiary pattern—meaning a stack of three tiles—in a corner space, God help you. Other complications include a series of incrementally difficult board patterns as you continue. Though relatively free of frills, everything is implemented clearly, and the online instructions, which include buttons to demonstrate each kind of move, are particularly helpful. But you ask, "Game Hall of Famester, is this game as addictive as those other tile games? Will it keep me up at night trying to win at upper levels?" Hey, if it wasn't we wouldn't be talking about it. You'll have tiles to go before you sleep.

Brain Game Runner-Up: 3 in Three
Inline Design. Requires: Mac Plus; 2MB of RAM for 8-bit color. $49.95.

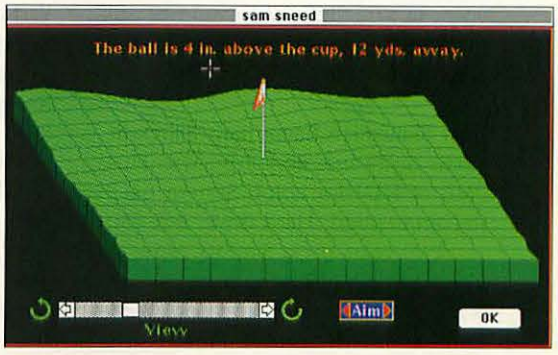
Cliff Johnson's latest effort is even more challenging than Fool's Errand and At the Carnival.

Best Sports Game: PGA Tour Golf
Electronic Arts. Requires: Mac Plus; 2MB of RAM for color. $59.95.

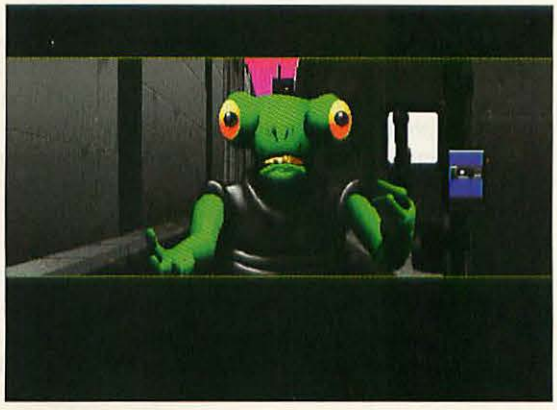
Of all sports simulated on the computer, golf somehow seems the most felicitous. Perhaps it is golf's unique pace, which could kindly be described as glacial. It also helps that only one thing occurs at a time—you don't have the problem of limiting your input to a fraction of the action, as is the problem with, say, football or basketball simulations. No wonder that previous Hall inductees (MacGolf, World Class Leader Board) have provided an artificial day on the links.

All golf simulations include such features as club selection, wind conditions, and breaks in the greens, but none has so thoroughly done the job as PGA Tour Golf. From the game's very beginnings, where you swoop over the hole in a dizzying replication of a television preview (complete with annoying Wagnerian music), it is clear that PGA Golf is out to skin the competition. The most notable twist is that you are enrolled in a tournament, playing against real PGA pros, who often appear on the screen offering unwanted tips on how to play a given hole. Shut up, Fuzzy! The real interest here is the quality of play. PGA Golf implements an unbeatable method of swinging at the ball, and includes all sorts of interesting features. Example: It has nine—nine!—different *lies* your ball can land on, each one requiring an adjustment. It also has the best implementation of such phenomena as backswing and fringe putting. Especially innovative—maybe too much so—is its way of showing you the surface of the green: you get a wire-frame 3-D model that looks less like Pebble Beach than it does a differential equation in

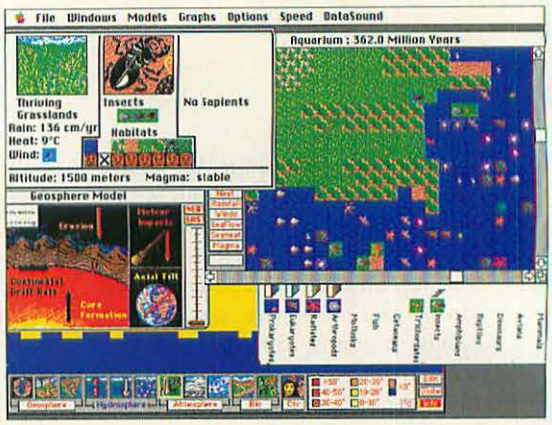




Fore! Our intrepid golfer gets ready to nail an approach shot in PGA Tour Golf (top). Then, above, time to deconstruct the putting green.

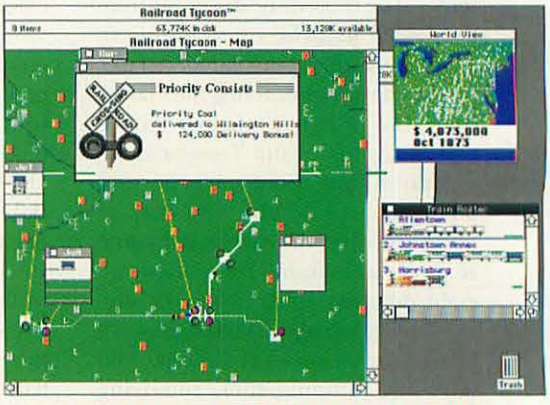


Lost in Space Spaceship Warlock is the first true cyberpunk work of art available on interactive compact disc.





Earth Angles With SimEarth the world is your oyster, as soon as you learn how to decipher the millions of display options. If you get bored, set off a nuke.



Train of Thought Monopoly meets "Petticoat Junction" with Railroad Tycoon, the highest-gauge role-playing game in years.

Mathematica. Perhaps the best thing of all is the speed with which the graphics appear—the screen redraw time is much quicker than that of its predecessors. I would place PGA Golf's speed in the range of "adequate." In other words, you can actually play a round of golf in much less time than it takes to play a round of golf.

Best Simulation Game (tie): SimEarth
Maxis Software. Requires: Mac Plus; 2MB of RAM for color; System 6.0.2. Recommended: Hard drive. $69.95.

Two years back, SimCity came on like a tornado, blowing away all contenders. Now comes the sort-of sequel. SimEarth is more ambitious—instead of building a city, you fine-tune Gaia, the earth according to the controversial yet attractive ecological theory that views the planet as a single living system. (SimEarth comes with a cautious caveat that not everyone buys the Gaia hypothesis.) The program integrates a wealth of information about geology, biology, meteorology, evolution, and pollution control; and it is not only politically correct, but colorful and melodious to boot.

In fact, there's almost too much going on—in order to keep track of the various phenomena factored in (everything from wind currents to ocean temperatures to biotechnological epidemics), you have to be as omniscient as the Being who presumably cranked out the real thing. So you find yourself worrying less about constructing a world over a period of aeons, and feeling free to tinker—to unleash meteors from the firmament, introduce dinosaurs into the age of nanotechnology, and drop nukes into the Ice Age. And every so often, you can play it straight and try to rule the world from the present day, trying oh-so-sincerely to save the planet from the greenhouse effect or other unnatural disasters.

Another way to play is to generate your own planets and see how quickly you can get them to yield life. I mean, you may not like Earth, but can you do better? SimEarth ain't easy, but it's always absorbing, and much more interesting than hearing Jackson Browne sing songs about fluorocarbons. Kudos to Will Wright and the folks at Maxis.

Best Simulation Game (tie): Vette
Spectrum HoloByte. Requires: Mac Plus; 2MB of RAM, 4-bit video board, and hard drive for color. $59.95.

After a tough few hours of playing God with SimEarth, one might need to get down to something closer to real life. And what better than to slip behind the wheel of a vintage Corvette Sting Ray and drive like the wind, terrifying other motorists and displaying your taillights to pursuing patrol cars? The usual thrills of driving simulations are to be found in Vette, which sticks you behind an authentic dashboard of a car, but the most innovative twist here is that the racecourses run through the city of San Francisco, rather ambitiously rendered. Don't lose the map of the city, as you'll need it to navigate your way from each course's starting point to the finish line (a typical race goes from the Golden Gate Bridge to the Bay Bridge, racing past Coit Tower and through Chinatown).

Controls are tricky here—a joystick is best, but otherwise you're better off with the numeric key pad, as manipulating the mouse doesn't translate to smooth steering. Your computer opponents, who drive sports cars of foreign origin, are very good—too good, in fact, for all but the most skilled drivers. While Vette has a feature to race real-life opponents by modem, our testers—experienced cyberspace jockeys—were unable to get it working. So ride Vette solo, and get your edge by nailing down the best shortcuts through the streets of San Francisco. And watch out for the cops.

Best Adventure Game: Loom
Lucasfilm Games. Requires: Mac Plus; System 6.0.3 (System 6.0.7 for music); hard drive. $44.95.

If anyone is going to create an adventure game with the resonance and splendor of the *Star Wars* trilogy, it is bound to be Lucasfilm. Loom doesn't quite do that, but it comes close enough to restore freshness to the creaky genre of adventure-fantasy

games. The plot, which is forwarded by cinematic exchanges on screen as well as by an accompanying tape cassette (Dolby B, natch), deals with a fabled guild of weavers who integrate meaning and magic into their work through musical patterns. These little snatches of electronic melodies, reminiscent of the extraterrestrial notes from *Close Encounters of the Third Kind,* provide a charming innovation: you must remember them and generate them to cast spells. The game play here, due to the company's superb graphics system (also used in the runner-up, Indiana Jones and the Lost Crusade), keeps you in the action at all times—besides being wonderfully rendered, the game is easy to manipulate (no commands required), and you never find yourself killed for trying something that seems interesting at the time. All in all, an imaginative coup that will satisfy adventurers and lure newcomers to the field. The only drawback is the off-disk copy protection, which requires retaining two pieces of easy-to-lose material, and which is awkward and time-consuming to use in a way that the game itself never is.

Adventure Game Runner-Up: Indiana Jones and the Last Crusade

Lucasfilm Games. Requires: Mac Plus. $39.95.

It is no coincidence that this Lucasfilm entry uses the same adventure-game generator as Loom's. This is the best translation of a hit movie to a computer game that we can remember.

Best Role-Playing Game: Sid Meier's Railroad Tycoon

MicroProse Software. Requires: Mac Plus; Mac II, 2MB of RAM for color. $69.95.

The best role-playing games allow you to assume a position otherwise unimaginable; provide insight about a given role in a given place and time period; and deliver delicious, unwholesome fun. Sid Meier's Railroad Tycoon delivers all of this in a well-researched, stunningly detailed game that lets you be a robber baron in the privacy of your own home or office. Railroad buffs will appreciate the lore and paraphernalia of the early days of locomotives; followers of history will approve of the successful transplanting of the gestalt of the nineteenth century, especially since you can establish your lines in the American East or West, Europe, or England. And those whose competitive skills thrive on dog-eat-dog capitalism will find RR Tycoon makes Monopoly look like Go Fish in its ability to ruthlessly build empires. You can even manipulate the stock market! Ultimately, though, Railroad Tycoon is about trains—laying track, building stations, scheduling and maintaining the rolling stock. Only gradually do you realize that you are industrializing the modern world. Though there are about a million complications, a clear, informative manual and easy-to-decipher graphics make sure that the challenge comes from the task at hand, not figuring out how to play the game. At the Game Hall of Fame, we found it very easy to start Sid Meier's Railroad Tycoon after dinner and look up to see the sun rise.



Staff Confection The hooded traveler above represents you, the seeker of the secrets of Loom, which unfold by crafty wand-waving.





'Vette Worth Open up that Golden Gate—and outrace the cops—as you zoom through The City in your tuff Corvette. Don't forget your map.

Best CD ROM Game: Spaceship Warlock

Reactor. Requires: Mac II; 4MB of RAM; 13-inch or larger color monitor; System 6.0.2; CD ROM drive. $95.

Last year Macintosh auteur Mike Saenz created Virtual Valerie, a CD ROM adventure whose isolated moments of brilliance were buried in a sea of soft-core porn. With Spaceship Warlock everything is forgiven. Saenz and codesigner Joe Sparks have come up with a dazzling multimedia science-fiction novel that tips its hat to pulp classics while showing us the way to the future. True, as an adventure game its logic is less than rigorous, but this is not so much a game as an artifact. Its richly detailed graphics, its consistent sense of humor, its ultrahip soundtrack, and its deliciously seedy *noir* style add up to an experience as awesome as anything Bill and Ted ever imagined. Or William Gibson, for that matter. Spaceship Warlock is the best expression of cyberpunk available in any medium, perhaps the best reason yet to hook up a CD to your Mac. M

See *Where to Buy* for contact information.

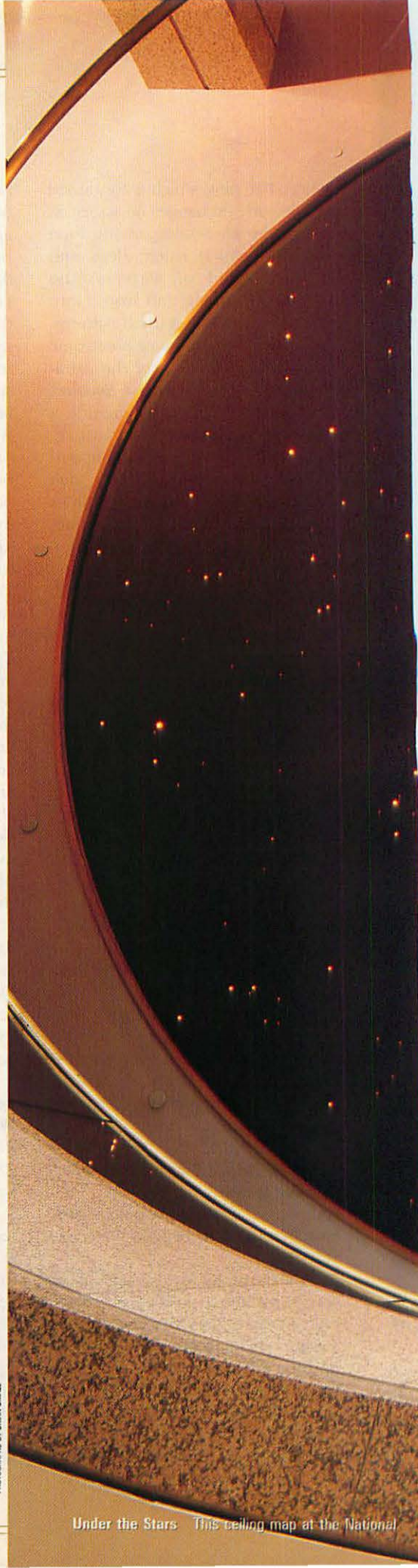
Steven Levy, *a* Macworld *columnist and world-renowned gamester, has tended the Macintosh Game Hall of Fame since its inception.*

Every Pixel on the Planet

Exploring desktop mapping on the Macintosh

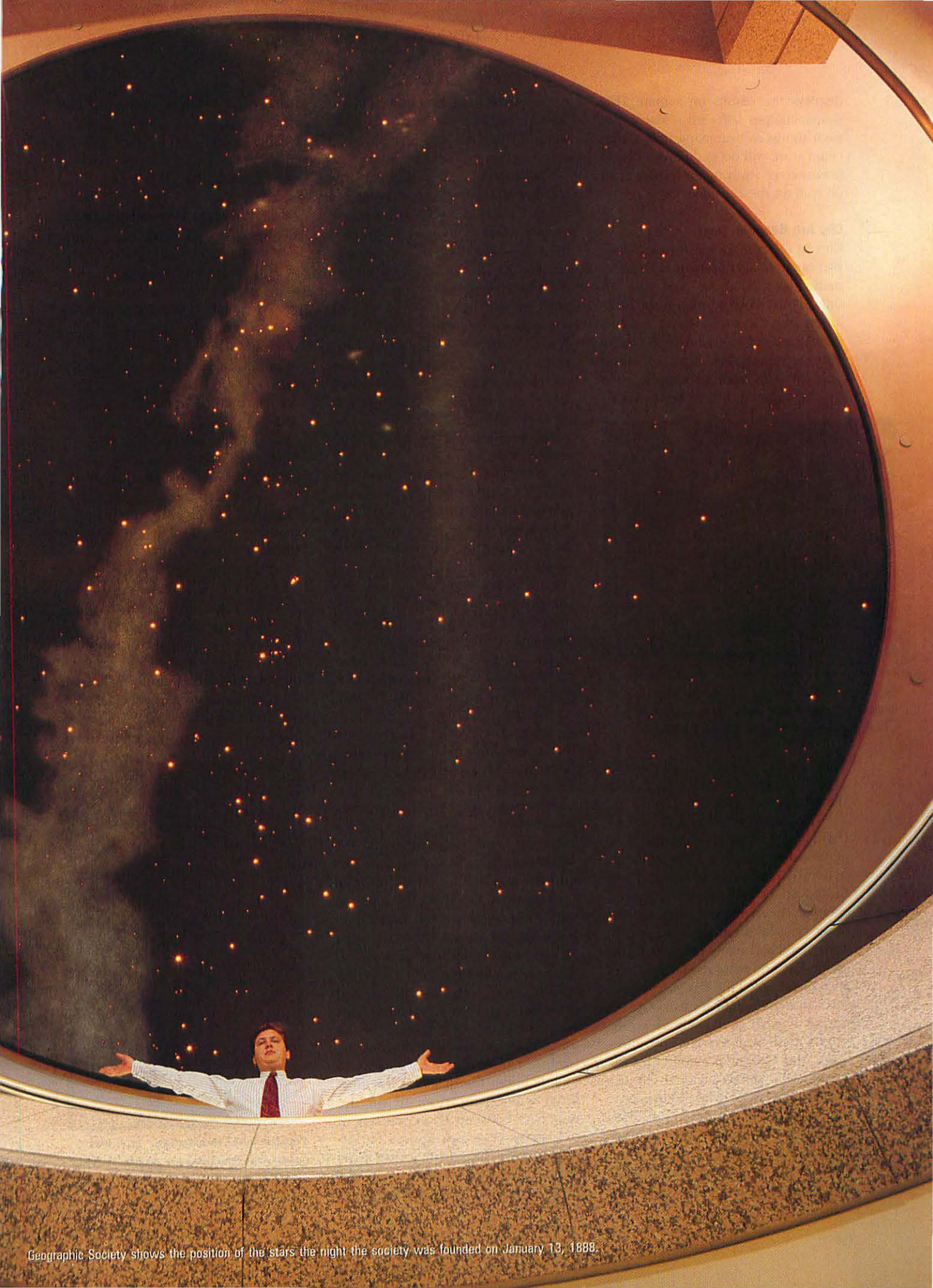
by Dan Littman

Throughout history people have used maps to make wise choices about everything from how to sail the oceans to where to build a city. Today people are using computers to draw maps and link them with database information that has a geographical component—a zip code in a mailing list, for example, or a missile silo pinpointed by a satellite. Computer-based mapping is useful for desktop publishing and for business and marketing. It is also important in social research and setting policy. Many kinds of mapping software are available for the Mac. Clip art collections offer informative but static maps for desktop publishing and presentations. Beyond clip art, there are desktop mapping packages that allow you to display your own data on a map in many ways, such as coloring regions or assigning symbols to data points according to their values. These programs fall into two categories, depending on the strength of their analytic tools. The simplest ones, thematic mappers, display data on a map; one glance at a thematic map can tell you how population density varies among Asian countries or which cities in New England spend the most on beer. More-sophisticated software lets you use statistics and other database tools to ask complicated questions of data—even geographical or spatial information that a normal database program can't understand—and then



PHOTOGRAPHS BY BRIAN SMALE

Under the Stars This ceiling map at the National



Geographic Society shows the position of the stars the night the society was founded on January 13, 1888.

displays the results on a map. This spatial-analysis software is useful for such things as estimating how well a chain store will do in different neighborhoods or studying the impact of an oil spill on the coastline.

Clip Art: Beautiful Lines

Clip art offers maps for display only—you can't connect them up with information in a database—and you can only display a clip art map at the resolution that the cartographer used to draw it; zoom in too close, and there's nothing but jaggies. Here are some unusual maps. (For a comprehensive listing, consult Erfert Fenton and Christine Morrissett's book, *Canned Art: Clip Art for the Macintosh* [Peachpit Press, 1990].)



At the National Geographic Martin Walz, computer graphics coordinator of the publications art division at the National Geographic Society, uses Illustrator files translated from the cartographic division's Arc/Info mainframe GIS system.

The Electronic Map Cabinet (from Highlighted Data) is a 385MB cartographic database on a CD ROM. It can generate maps of any part of the United States at whatever scale you choose. These maps show state and other political boundaries, highways, waterways, and many other features, defined at fine resolution. Once you get a map framed the way you want it, you can draw new features on it, annotate it with text such as street names, and save it as a PICT file. Electronic Map Cabinet is a good idea for anyone who needs detailed clip art and has a CD ROM drive, but the program is painfully slow, even on a Mac II, and has some bugs—for example, the current version bombs under MultiFinder. But at $199.95 Electronic Map Cabinet provides a mountain of maps for the price of a molehill. And version 2.0, due out in winter 1992, will add MultiFinder compatibility and enhanced redraw performance.

MacroMind/Paracomp's The Original SwivelArt, which comes with a version of Swivel 3D, is a collection of outline maps of most countries and the U.S. states. With it, you can give objects the illusion of depth, move them around in a three-dimensional environment, and give them some shading. Unfortunately, each map is drawn to a different scale, so you can't easily combine them. However, you can create some neat effects, such as extruding a country, tilting it back at an angle to make it look like a *USA Today* weather map, and adding lights and shadows.

MicroMaps software produces collections of maps that are distinguished by fine artwork. The MapArt collection, sold in sets called MapPacks, comprises collections of detailed PICT and EPS maps for every country in the world; maps of regions of the world; world maps in different projections; and specialized U.S. maps including congressional districts, area codes, zip codes, and others. MapPacks' Global Perspective maps look down from space at 19 different spots on the globe.

Instead of buying clip art, you can use a special-purpose map-drawing CAD package called Azimuth (from Graphsoft) to create your own.

Azimuth comes with a high-resolution North America geography file and both low- and high-resolution world geography files. You pick a file; choose a projection (that is, the method used to convert the three-dimensional earth to a flat surface); select what you want to show; set other factors such as the angle of view; and Azimuth renders the map. Once the map is drawn, you can add text and embellishments with Azimuth's vast set of precision CAD tools. You can also add details to the underlying geography files. The maps of continents look fine, but the quality is less than ideal when you zoom in on the boundary between two countries or two states. You can import better-quality DXF files from other CAD packages (or use a tablet to digitize them in Azimuth), but Azimuth can't import the widely available text files of geographic data such as streets or county boundaries. Azimuth exports maps in PICT and EPS, for desktop publishing, and in DXF.

Adding Database Information to Maps

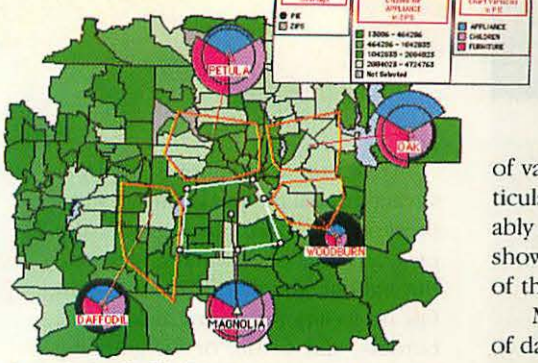
Clip art offers arresting map images, but desktop mapping programs let you link map images with information in a database. Most Macintosh mapping programs are vector-based (we'll look at the other kind, raster-based programs, later). They use two kinds of data files. The first is a geographical file, which contains the numerical descriptions of the points, lines, and polygons (which describe a region by its boundaries) that the computer uses to draw a map. The second file is a database of information that corresponds to the geographical information contained in the map file, such as census information on population or income.

To create the correspondence between the data and the map, you must geocode the data by matching a field in the database such as the street address, zip code, or state to a location on the map. For example, if the map file contains information on zip code locations and your database has zip codes for all your customers, a mapping program can place a symbol



SPOT IMAGES © 1991 CNES

President Bush's Neighborhood Dr. Richard Podolsky and Philip Conkling at the Island Institute used GAIA to create this map of wetlands on the coast of Maine.



Strategic Retail This Tactician map analyzes retail sales potential in selected zip codes and in each of five hand-drawn retail trading areas.

where each customer is located or add up annual sales for all customers in each zip code.

The resolution of a vector-based map is independent of the image displayed on screen; like a draw program, a vector-based mapping program scales the map to whatever view the user requests. Vector-based geographical data is well suited for representing man-made areas, such as zip code centroids (the center of a zip code region), county boundaries, roads, and census tracts.

Thematic Mapping: Ideas in Color

Thematic mapping lets you graphically display data that is linked to a map. For example, with a database of information about the Peruvian cholera epidemic you could map provinces reporting no cases of cholera in blue, provinces reporting fewer than 1000 cases in yellow, and provinces reporting 1000 or more cases in red. Strategic Mapping's MapMaker; Newton Technology's easy-to-use, presentation-oriented Geovista; and MicroMaps Software's HyperCard-based QuickMap all have features for presentation-quality thematic mapping.

MapMaker offers a lot of flexibility for drawing and presenting maps. You can add new boundary information and precise line information with a digitizing tablet; or you can read in tables of latitude and longitude coordinates, and the program draws the boundary. The program supports many projections. MapMaker maps have unlimited layers that can display geographical and database information, and you can hide and display layers at will or set them to appear at different zoom levels. The size of map symbols can be based on value, an effect called graduated symbol mapping, and MapMaker can create cartograms, maps in which the relative size of various features is based on a particular statistical value (you've probably seen population cartograms that show China and India covering most of the globe).

MapMaker can display a histogram of data in a legend, and the program provides tools for adding circles, arrows, and text to a transparent layer for annotation. MapMaker's commands can also be driven by scripts pasted to the Clipboard from applications such as Excel or HyperCard.

On the negative side, MapMaker is complex and confusing at times. It doesn't support special characters, such as percent signs, dollar signs, or the degree symbol. And although MapMaker can autotrace imported paint files, it does so only at screen resolution. In November 1991, Strategic Mapping will release Atlas Pro. It will include street-level analysis, an internal database, and full-color support for $795 ($249 for MapMaker owners).

Geovista's main advantages are its ease of use and that it is better than MapMaker for creating presentation maps. And Geovista comes with an exhaustive manual. The program supports 32-bit color and lets you choose which ones to use on your map, while MapMaker only supports 8 dowdy colors, and chooses them for you. Geovista has a page-layout window where you can arrange the map, its legend, and its title, and you can stretch or shrink the map to fit a page. Geovista comes with county boundaries for all U.S. states; for MapMaker, county boundaries cost an extra $195 or $295 depending on quality.

Unfortunately Geovista can't read external text files; they must be cut and pasted into Geovista's table, which has three columns but can display the contents of only one at a time. The program doesn't allow you to move parts of a map—for example, to drag Massachusetts a few miles offshore to emphasize it. MapMaker does.

The best thing about QuickMap is that it is a HyperCard stack, so you can use other HyperCard features with it. The included Custom QuickMap utility makes it easy to create new maps and relate geographical data to them. You don't get the cartographic precision you'd get with a digitizing tablet, but if you want to map turnstiles at a football stadium, precision isn't your primary concern. QuickMap's maps are in black and white.

Analyzing Your Data

Thematic mapping is fine as long as the main question you need to answer is where on a map the data you've collected belongs. But as soon as you decide to analyze the data further, you need the database-query and -management tools provided by spatial-

DATA SOURCES

Two types of data are offered for sale: cartographic data, the files used to draw vector-based maps; and demographic files, the data displayed on maps. Prices for data range from $95 for a basic county-boundary map to $15,500 for a collection of boundary maps and demographic files. This cross section of data vendors isn't the only place to look, but it is a place to start.

Geographic Data Technology (GDT) sells U.S. Census Bureau (USCB) information. 800/331-7881.

Donnelley Marketing Information Systems offers Market Potential Reports on the retail market in both database and written form. 203/353-7275.

National Planning Data Corporation supplies both cartographic and attribute data from the USCB; in December topologically integrated geographic encoding and referencing (TIGER) files will be available. 607/273-8208, 800/234-5973.

Calfornia State University, Northridge, professors William Bowen and Eugene Turner culled demographic information from every decennial U.S. census since 1790 into a 550MB Census Mapping Project CD ROM, $90. 818/885-3317.

Urban Decision Systems (UDS) offers demographic and marketing attribute data based on the 1980 census. Updates are available for the current year, future five years, or past years back to 1970. 213/820-8931.

The U.S. Census Bureau's 1980 census data, both cartographic and attribute, is available; 1990's TIGER/text data is limited to cartographic information only, but that information alone takes 32 CD ROMs (about 20GB). Check your local telephone book for the regional office.—**Suzanne Courteau**

SPATIAL-ANALYSIS PROGRAMS

	Descartes 1.04	GeoQuery 2.0	MapInfo for Macintosh 1.1.1	Tactician 2.1.2
Vendor	PC Globe	GeoQuery Corporation	MapInfo Corporation	Tactics International
Price	$395	$395	$995	$2495[1]
Direct mainframe access	○	●	○	●
Chart types	A	none	A, B, C, E, F	A, B, D
Internal database	relational	none	SQL	none
Geographical data supported	United States	United States	United States, international	United States, international
Can analyze	regions, points	regions, points	lines, regions, points	lines, regions, points
Can display	lines, regions, points	regions, points	lines, regions, points	lines, regions, points
Number of functions	19	3	25	32
Save and reuse queries	●	○[2]	○	●
Combine or create boundaries	●[3]	●[3]	●	●
Interactive and automatic geocoding	NA	NA	●	●
Control order of layers of map	○	NA	●	●
Stop redraw	●	○	●	●
Display regions as	G, I, J	G	G, H, J	B, G, H, I
Display points as	J	K	J, K, L, M, N	K, L, M, N
Number of data ranges	10	10	16	20
Attribute and cartographic data available	●	●	●	●

● = yes; ○ = no. A = bar, B = pie, C = scatterplot, D = thermometer bars, E = area, F = line, G = color or shading, H = dot density, I = bivariate mapping, J = set manually, K = symbols, L = colored symbols, M = graduated symbols, N = symbol sequences.
[1] $5495 with hi-res zip codes; $9995 with DIME street maps for 54 metropolitan areas, software not included. [2] Queries reusable with DAL. [3] Detail level limited to zip code.

analysis programs. Three of them are designed for market analysis and planning: GeoQuery, an easy-to-use though somewhat limited thematic mapper tuned for marketing; Descartes, which has a full-featured relational database for slicing and dicing data; and Tactician, which is geared toward applying a company's central database to micromarketing. MapInfo for Macintosh is a general-purpose package that can do almost everything the other three can do and a lot they can't.

GeoQuery is designed for people who make marketing decisions, and it is far easier to use than the other spatial-analysis programs. It has no command language for programming the execution of repetitive tasks, has no facility for entering new geographical data (though it does let you split or merge regions), and can resolve data down to the zip code level only—good enough for analyzing most business data but not for planning emergency services. GeoQuery can display only one layer of point symbols and one layer of shaded information, and it does not support cartograms or graduated symbol maps or the manipulation or display of line files, such as rivers or roads.

On the plus side, GeoQuery supports Apple's Data Access Language (DAL) for mainframe database access, and it has the simplest interface for getting into a corporate database. GeoQuery allows you to select an arbitrary set of displayed points on a map and copy their associated records to a file or the Clipboard. The program produces the most attractive maps of the business-oriented packages, and has an excellent manual. GeoQuery 3.0 ($395), due out in October 1991, will add AppleEvents support, improved search features, and support for linear data.

Descartes provides many more data-analysis tools than GeoQuery. Descartes also includes a full-featured relational, though nonprogrammable, database. Besides maps, Descartes offers sophisticated tools to extract data from a database, manipulate that data, and present it in such formats as bar charts and columnar reports. The results of a database query are represented by a basket icon; drag the icon to a map or a bar chart, and Descartes displays the information. Descartes lets you create new geographical areas by combining regions, which the program can resolve down to the zip code level. Descartes, like GeoQuery, comes with zip-centroid files for the whole country, which identify the center of each zip code region; but both programs' publishers charge extra for including the boundaries of each zip code area. And although you can add lines, points, and boundaries to a Descartes geographical database, lines in Descartes are only for display; you can't, for example, select all the national parks east of a line representing Interstate 35.

Descartes is distinguished by a strong manual but has relatively weak presentation tools. For example, the program uses one font size and style throughout, and the bar-chart feature has no facility for setting tick marks, borders, and so on, or for graphing multiple series. In the interest of good cartography over flashy presentations, you can't change the color of a *single* map region, move it around, or do any other cosmetic stuff. Descartes does, however, have strong printing features, letting you set an arbitrary scale and add headers and footers. Descartes 2.0 (which will be a PC Globe product) will add presentation tools and access to external files in their native format.

Tactician is highly tailored to analyzing retail trade and optimizing territories, in particular sales territories. And it allows you to analyze a database down to street-level detail.



Tribal Land Status Paul Kip Otis-Diehl, computer mapping coordinator for the Agua Caliente band of Cahuilla Indians in Palm Springs, California, used MapInfo to create this map.

Tactician's tools make business analysis relatively simple. For example, the program can create a table that summarizes the population, income, age, and potential sales in your database, and aggregate the contents of all the zip code regions, counties, or other geographical units into sales-territory totals as you draw territory boundaries on the map. Special graphs also help with balancing sales-territory assignments. One graph has several side-by-side thermometer bars that grow and shrink to indicate the value of the territories you're adding to and cutting pieces away from.

Tactician also has an impressive set of functions and operators for



Putting Crime on the Map Professor William Bowen of the department of geography, California State University, Northridge, used MapMaker and U.S. census data to create this map. Canvas 3.0 and Illustrator were used for final editing.

searching and modifying data. Dictionary files enable you to save formulas and queries, along with color sets for thematic maps, symbolic icons, user preference, and many other reusable bits and pieces, so people sharing a multiuser database can each have a dictionary with their own preferences. Tactician reads external tables in many formats, including SQL (structured query language) data via Apple's DAL.

Although Tactician doesn't support digitizing new geographical details, it has built-in facilities for importing geographical data from many data suppliers. Theoretically Tactician can create maps for any country in the world, but geographical data for many areas is hard to come by. You need a CD ROM drive to read the high-resolution zip code data and street maps, and you'll probably want to copy the contents of the CD onto a fast hard drive—140MB for the high-res zip codes and 600MB for the street maps. (Tactics will install data on a hard drive if you ship it to the company.)

MapInfo shares many capabilities with the business packages I've just described, but it differs in some fundamental ways. In MapInfo you can set the scale to any proportion you want and draw your own geometrical data, so you can map rooms inside a building or slips at a marina. Not even Tactician can do that. And MapInfo's database and analysis tools are vastly more sophisticated than those in GeoQuery, Descartes, and Tactician.

MapInfo can read external files in FoxBase, Excel, Lotus, and text formats, and it has an internal SQL database. A SQL initiate would consider MapInfo's point-and-click SQL interface flexible and easy to use. But if you are a novice, you may find it a trial to get the data you want, and once you get a query to work, there is no way to save and reuse it. The query tools provide 25 functions, including such spatial-manipulation features as finding the center or area of a region, calculating the length of a line, and doing trigonometry. MapInfo can color or shade points and polygons as well as lines—for example, displaying all streets with parking meters in red.

MapInfo's graphing capability is impressive. It provides a wide variety of chart types as well as a good set of presentation features, such as control over the order of the wedges in pie charts, and control over the distance between (or overlap of) bars. MapInfo's serious graphing features include setting where the x and y axes cross, graphing multiple series (though you can't superimpose a line graph on a bar chart), and setting tick-mark spacing.

The first version of MapInfo was buggy and crash-prone, and its manual was even buggier. It reminded me of several frustrating hours I once spent lost in Rome—until I realized that my map of that crazy city was drawn with north and south reversed. Version 1.1.1 is more stable (though it is still not crash-free), but there are still errors in the documentation.

MapInfo can't perform such esoteric spacial analyses as finding all the rivers with a certain flow rate that cross sedimentary soils, nor can it grind through a database looking for the best way to apportion voter precincts, but it lets a serious user go well beyond the limits of thematic mappers and business-oriented packages.

Raster-Based Mapping

Raster-based geographic-information systems represent maps as digital images that are chopped up into a regular grid of cells. Each cell contains a single value, in much the same way that a paint program stores color information about each pixel. In a raster-based system there are no lines or polygons that define a map. Raster-based programs are most suited for analyzing landforms and land use—qualities that are natural, such as soil type, or imposed by people, such as crop types. GAIA (Geographical Access, Information, and Analysis), developed at the environmentalist Island Institute in Maine, and macGIS, developed at the University of Oregon's School of Architecture and Allied Arts, Department of Landscape Architecture, are both raster-based GIS (Geographical Information System) systems designed for the Mac.

GAIA uses digital satellite data to create coherent maps of ecological

FOR SERIOUS USERS ONLY

MapGrafix is a vector-based program distinguished by its strong tools for creating maps and managing cartographic information. There are also two add-on modules; MapView for converting maps to different projections, and MapLink for translating maps from many different formats (including Arc/Info and DXF) and selectively extracting geometrical information. MapGrafix is currently the only GIS on the Mac with a programmer's tool kit for creating custom applications. It is also the only Mac package that can perform corridor analysis. For example, it can display the homes of all people over 65 years of age; living within 400 feet of a line, such as a proposed road, or a polygon, such as a shopping center. (MapInfo can only calculate distances from a point, such as an intersection.)

MapGrafix costs $4995 (recently reduced from $8500) for the software with no data. MapLink costs $995, MapView costs $495, and the developers tool kit is included in the core package.

ArcView 1.0 is the first Mac product from Environmental Systems Research Institute, publisher of the leading mainframe GIS, Arc/Info. Due to ship in early 1992, ArcView will include point-and-click access to Arc/Info geographical databases; the ability to display, pan, and zoom satellite remotely sensed data or any raster image; the ability to overlay vector data on a raster image; a way to link map features to tabular data sets, including any SQL database; simple statistical and database query tools; and support for TIFF, Illustrator, and other formats. 714/793-2853.

THEMATIC MAPPING PROGRAMS

	Geovista 1.02	MapMaker 4.53	QuickMap
Vendor	Newton Technology	Strategic Mapping	MicroMaps Software
Price	$189	$495	$99
Add new boundaries	○	●	●
Display regions as	color, shading	color, shading, dot density, cartogram, bivariates[1]	color
Display points as	none	symbols, colored symbols, graduated symbols	none
Command language	○	●	●
Format text globally	●	●	○
Format individual text labels	●	●	○
Add text notes	○	●	○
Measure distances on map	○	●	○
Measure area of circle on map	○	●	○
Draw new boundaries	○	●	●
Digitizer support	○	●	○
Autotrace imported file	○	●	○
Colors available	16.5 million	8	black & white
Edit fill patterns	●	○	●
Select fill patterns	●	●	●
Number of data ranges	10	35	5
Perform calculations on data	○	○	●
Output format	Paint, PICT	PICT	Paint
Attribute format and cartographic data available	○	●	○

● = yes; ○ = no. [1] Effect is possible, but bottom map is a PICT file, not an active layer.

zones or other kinds of regions; it works somewhat like a thematic mapping program. GAIA can break an image into as many as 60 classes of information based on the colors assigned when the satellite image is preprocessed (GAIA doesn't perform the initial processing—there are service bureaus that specialize in converting raw satellite data into a usable format). You can combine classes into groups such as all agricultural or forested areas, and calculate how much acreage is covered by each.

If you have a vector file of such things as roads or political boundaries, GAIA can display the vector file as an overlay on the map, but GAIA has no vector-analysis features. The overlay file simply helps users make eyeball comparisons of the areas on the map. GAIA 2.0 will add 24-bit color, PICT import, and the ability to read and display names of vector overlays.

macGIS provides a wide range of tools for analyzing geographical information, which GAIA lacks. In macGIS you scan a map such as a USGS (United States Geological Survey) topographic quadrangle, open the scan in macGIS as a PICT file, set the scale for the grid cells, and encode the cells by assigning values to each of them. Encoding normally involves tracing with a mouse or digitizer around the source map's contours, from which you can create maps of altitude, slope, and other information derived from the contour. For other attributes such as vegetation value, you create a new layer for the map, and assign new values to the cells for these attributes.

macGIS has an impressive collection of 19 commands for analyzing data. You might, for example, create a new map showing the average values of several layers—perhaps annual rainfall over the last five years. The Clump command lets you look at each cell's neighbors and group related cells, for example, to create a forest from adjoining cells containing trees. The Radiate command looks at every cell's elevation and determines which cells are visible from a location you specify, something an architect might use to figure out the view from a building being designed. macGIS has a command language with equivalents for most of its functions, and you can record your actions as a macro. Students can get macGIS 2.0 for $29.95 ($125 for faculty), which will provide multiple window and color support, from HarperCollins Publishers.

Mapping Your Choices

If you need street maps or are on a tight budget, Electronic Map Cabinet is a reasonable choice for clip art. For clean, attractive maps of many areas and maps outside the United States, MapPacks can't be beat, but the cost adds up quickly if you need more than one or two regions. If what you need isn't available as clip art or you use maps enough to bother learning a bit about cartography, Graphsoft's Azimuth is a great tool for mapping the big picture, though not quite so good for maps of small areas.

MapMaker is the product I'd pick for thematic mapping. It lets you add new boundary information or read in tables of latitude and longitude coordinates; it gives you control over what information is displayed at different altitudes; and it has many useful map types, and projections.

If you need to extensively analyze data, don't need DAL, and can work inside its internal database, Descartes is a good deal. GeoQuery is useful if you need to see where data falls on the map, but you'll outgrow it when you begin asking "why?" If you need street-level mapping and won't be venturing far beyond marketing and territory analysis, Tactician is a better choice than MapInfo because so much of Tactician is preconfigured and it comes with a good supply of useful data. MapInfo is a clear choice if you want to create your own geography and geocode data to it, need an extensive list of geographical functions and operators, do a lot of graphing, and want an internal database and the ability to read external tables.



Getting a Global Perspective Azimuth was used to create this map of the Western Hemisphere from data gathered 8000 miles up in space.

If you need a raster-based program, GAIA and macGIS are both well suited to different tasks. GAIA is more appropriate for presenting raster-based data, macGIS for analyzing data extensively.

One caveat: When you get ready to buy mapping software, consider the amount and usefulness of the data that comes with it. Buying geographic data such as roads or county boundaries, and tabular data such as demographic information, can end up costing far more than the software. ■

See *Where to Buy* for contact information.

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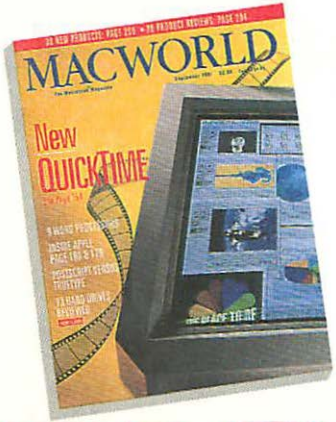
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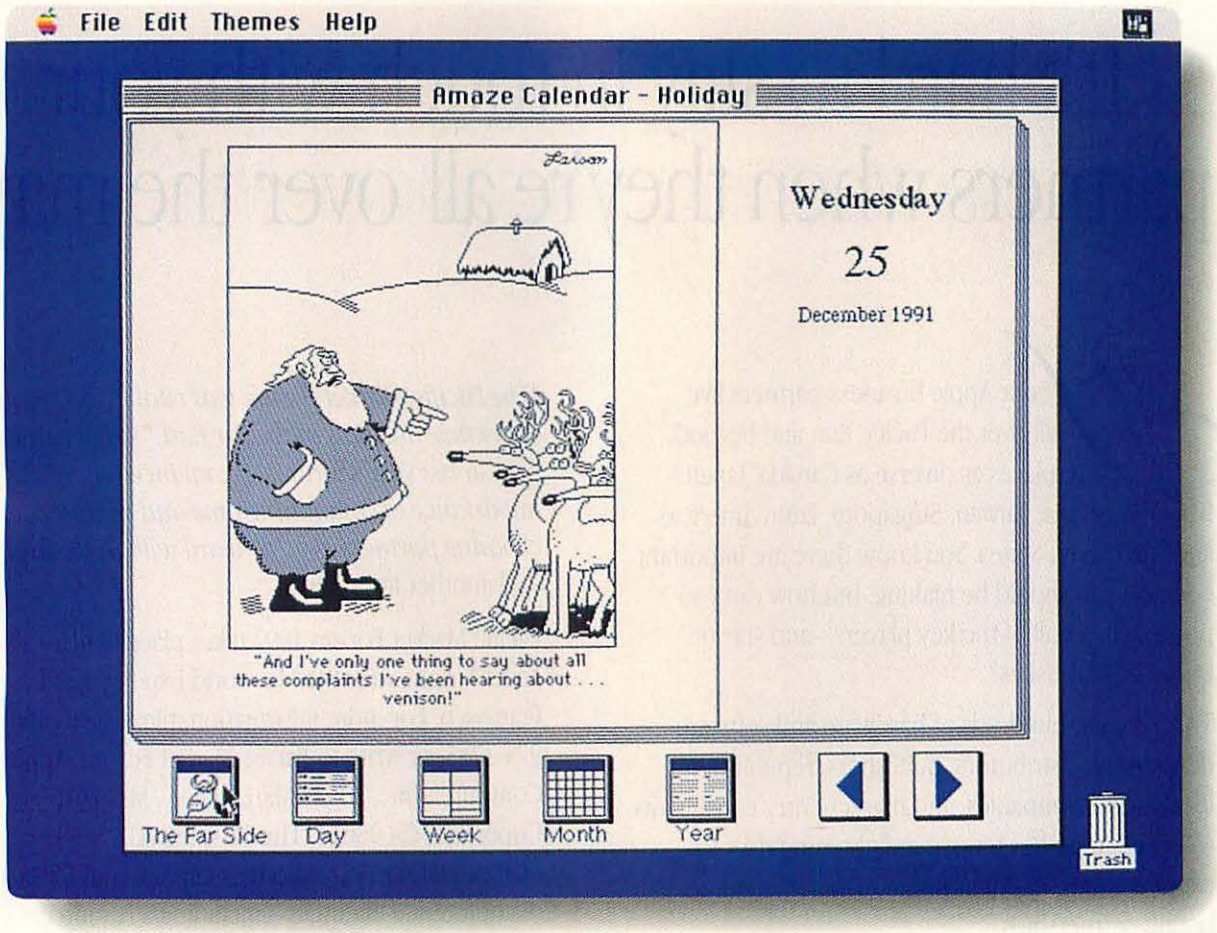
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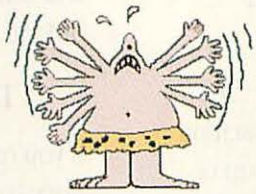
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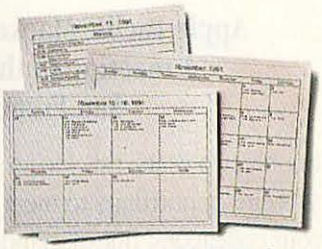
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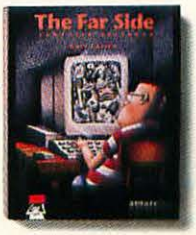


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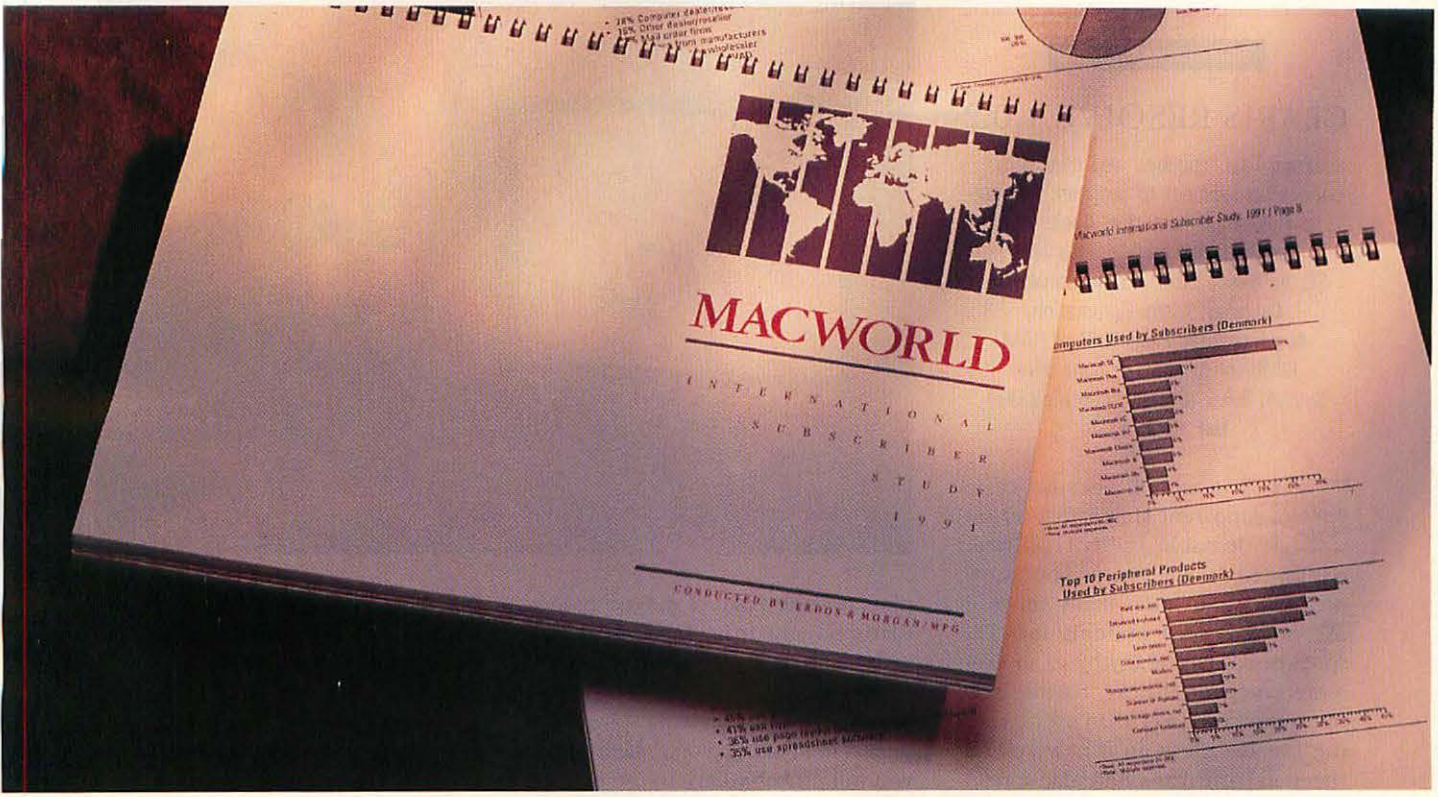
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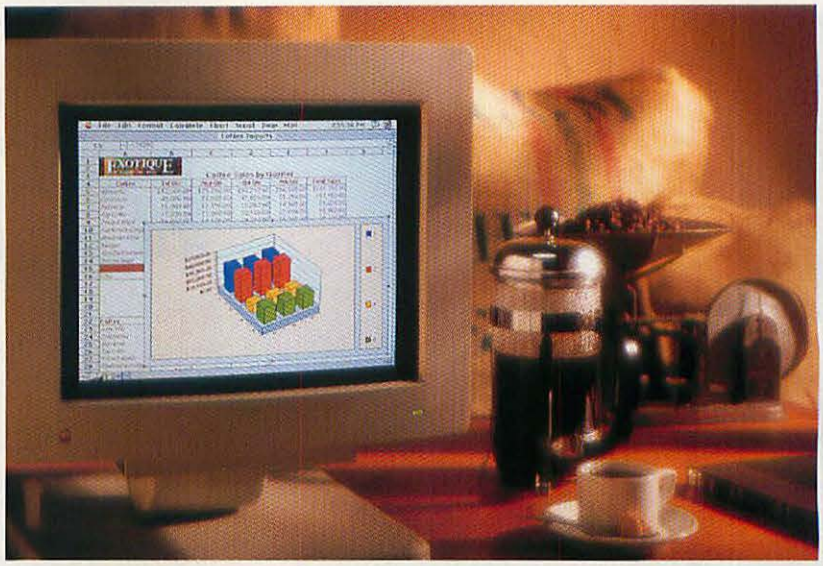
Circle 62 on reader service card

REVIEWS

Spreadsheet Program

CLARIS RESOLVE 1.0.2

Pros: Fast, capable, well designed; easiest spreadsheet to program; wonderful Help implementation. **Cons:** Interface sluggish on Mac Plus and SE; no direct Excel 3.0 file translation.
Company: Claris Corporation.
Requires: Mac Plus; 1MB of RAM (2MB for System 7); hard drive. System 6.0.5 (System 7–compatible).
List price: $399.



JOHN WILLARD

The wheel, because of its apparent simplicity and undeniable utility, has been reinvented (there are, as you know, proverbs about this) many times in the most recent millennium. The spreadsheet has, if anything, an even more energetic history, having been reinvented no fewer than six times in the last decade. Can a new spreadsheet, in particular a new Mac spreadsheet, possibly have anything new to offer? The answer is yes, surprisingly enough. Resolve is not just very good, it's actually the *right* spreadsheet for many purposes.

Basics

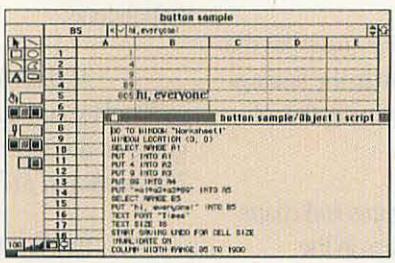
A spreadsheet these days must, minimally, do arithmetic, provide every mathematical function you ever met in school, allow and in fact encourage nice formatting for presentations, and get out of its own way on recalc. Resolve does good work on these points, with a huge (149 built-in functions), well-organized function set and fast computation code inherited from Wingz (see "Comparing Spreadsheets"). Resolve's graphics facilities rival those of dedicated business presentation-graphics programs; 3-D bar charts, wire-frame plots, and contour plots were also part of the technology Claris bought from Informix, along with all the expected chart variants.

It's easy to create 3-D charts in Resolve. Unfortunately, Resolve has a default limit of 81 colors, which means you will probably have to use a different program for final boardroom-quality presentation graphics.

Points to Resolve

Claris's decision to put drawing tools on a default, side-of-the-spreadsheet palette will strike not just accountants but even checkbook balancers and budget estimators as curious. On the other hand, the addition of a button tool that connects with a superior macro script facility means that users can effortlessly modify features of the program. To put a macro button on a spreadsheet, simply drag a button off the palette, name it, open a Script worksheet, pick Learn from the Script menu, and direct any actions you like from the commands in the menus. This macro script automatically attaches to the button. Furthermore, the whole macro appears in the closest approximation to plain English ever accomplished in a programming language (it's nearly the same as Wingz's laudable HyperScript) (see "Wholly Macros").

Resolve's button-script combination is so cleanly implemented that you can actually learn to use it just by referring to the advice in the Help facility. If you decide you want to change chart types with a single keystroke, you can make up a macro script of a handful of buttons that step through desired formats, and



Wholly Macros The script in the macro window describes pretty plainly what you see in the worksheet. This clarity combined with the ability to easily attach buttons to macros lets mere beginners customize Resolve.

put these buttons across the top of a worksheet. And you can document the buttons in a text object that you can move away from your work area.

Good Things in Big Packages

Claris has included some other nice touches in Resolve. As you might expect in a program whose assorted files take 5MB of space on a hard drive. The spelling checker, compatible with other Claris programs, will keep you from displaying "Annual Bugdet" on an overhead someday. The HyperCard tour is a worthwhile instructional course rather than a mere display of features. Resolve is the first spreadsheet whose headers and footers work as well as those in a word processor. The System 7 publish and subscribe features work nicely, at least with other Claris products. The program accommodates spreadsheets of effectively limitless size (32,000 cells by 32,000 cells, in virtual memory), and the benchmarks suggest that such a spreadsheet would recalculate in a mere six days instead of the two weeks Microsoft Excel would require.

Balance Sheet

Resolve is well done and thoughtfully planned. It combines the attractive features of Wingz with a refined interface that requires very little training. For use in an office where MacWrite Pro and FileMaker Pro are standards, Resolve is clearly the best spreadsheet choice. Excel has some moderately important advantages (outlining and the tool bar) and a serious business advantage (there is a PC version).

It is not clear from the benchmarks, but Resolve shows a definite case of click-lag on a stock Mac SE, presumably because of the interface information each click must summon. Nonetheless, the program is fun to use, requires very little consultation of its excellent manuals, and, more than any other program, brings advanced features within easy reach of spreadsheet pedestrians. Plus, Resolve is supported by a company that is going to be a major force in Macintosh software as long as the Mac shall flourish.

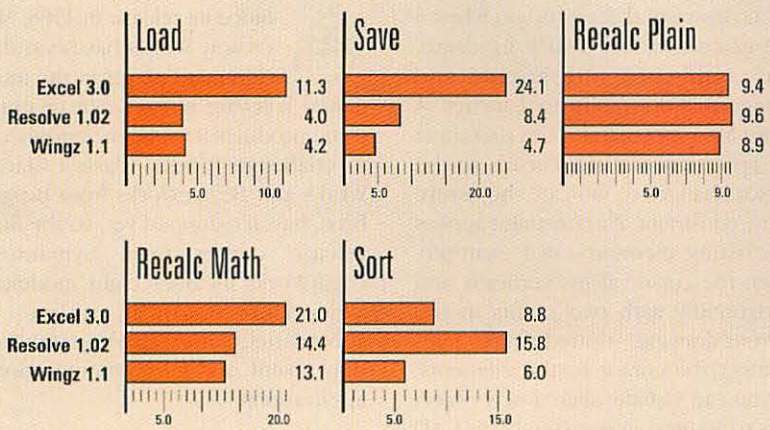
While market history suggests that Resolve will not topple Excel, which has a six-year stay at the top of the charts, Resolve is the first program with the features and corporate clout to take a big bite of Macintosh market share.

—Charles Seiter

See **Where to Buy** *for contact information.*

Comparing Spreadsheets

All times are in seconds.



Recalc was performed on two large (10,000-cell) worksheets: a plain, budget-style worksheet with mixed text and arithmetic, and a math worksheet with intensive use of special functions (sin, exp, log). Load and Save refer to the plain worksheet. Sort was performed on a single field in a database with 1200 records of 10 fields each.

Draw and Paint Program

CANVAS 3.0

Pros: External tools can be turned on and off at start-up; paints and draws in 24-bit color; blends multiple objects; can create mask and hole-cut effects; editable cursor constraints; automatic dimension labels; imports CGM, DXF, and IGES formats. **Cons:** Cannot import text files; dense interface. **Company:** Deneba Software. **Requires:** Mac Plus; hard drive. Recommended: 2MB of RAM. **List price:** $399.



SuperPaint was the first program to integrate bitmapped painting and smooth-line drawing capabilities into one package, but Canvas was the program that made the idea work. Canvas allowed multiple bitmapped objects to be moved behind or in front of other bitmapped objects, rather than being restricted to two separate layers—one for painting and one for drawing—as in SuperPaint. Canvas 2.0 implemented custom macro commands, support for the EPS format, and color-separation capabilities. Canvas was also one of the only draw programs to be available as a DA, so you could create paintings or drawings while working in another application.

With System 7, however, the days of DAs are fleeting into oblivion. Canvas 3.0 is available only as a standalone program, but it supports external tools that you can turn on or off at start-up, thereby customizing the program and adapting it to your computer or system. The externals include a tool that makes Canvas System 7–savvy, one that installs a spelling checker, and another that provides automatic bitmap tracing.

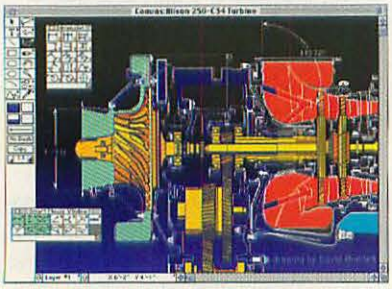
Focus Groups

Canvas 3.0 seems to be designed for a diverse audience—painters, illustrators, designers, engineers. If you're primarily interested in creating and enhancing bitmapped artwork, Canvas now provides 24-bit importing and editing capabilities. Its painting tools are nothing fancy—none of the spe-

(continues)



How the Apple Got Its Stripes Having drawn an apple shape in the foreground and colored rectangles in the background (left), I selected all shapes and applied the Intersect command to create a masking effect (middle). I then applied the Subtract command to cut an apple-shaped hole (right).



This CAD Is a Charmer Canvas 3.0 offers precision tools associated with two-dimensional CAD programs while maintaining a friendly interface. Shown here are the Dimension palette, which contains tools that can be used to automatically label lengths, angles, and diameters; and the Smart Mouse window, which applies a variety of customizable constraints to cursor movement.

cial brushes or image-editing filters associated with dedicated full-color paint programs—but they are sufficient for integrating bitmapped and object-oriented artwork.

For illustrators, version 3.0 adds high-end features that rival, and at times surpass, similar features in Adobe Illustrator and Aldus FreeHand. For example, both Illustrator and FreeHand provide blends that create intermediate shapes between two selected objects. But Canvas 3.0 lets you blend three or more objects at a time. Canvas can also create accelerating and decelerating blends, so that the colors in intermediate shapes change more (or less) gradually at the beginning of the blended series than at the end.

Another powerful illustration tool is Combine, which provides five ways to merge multiple objects. The Intersect option deletes all portions of selected objects that exceed the boundaries of the foremost selection, resulting in a masking effect. The Subtract option deletes the outline of a foreground object from selected background objects, resulting in a hole-cutting effect (see "How the Apple Got Its Stripes"). Other options trace the outlines of selected shapes—exteriors only or exteriors and interiors—and slice background shapes with a selected line.

Canvas 3.0 provides some of the most versatile text-editing features offered by any draw program. Its text editor offers manual kerning controls, a spelling checker, and a full-function tab ruler for creating tables and price lists. If you're looking for something a little more dynamic, you can wrap type inside an object, slant the margins of a text block, or bind text to a curve. Canvas 3.0 is also the only draw program that converts both Type 1 PostScript and TrueType fonts to editable outlines, a prerequisite for creating logos and other text effects. In fact, Canvas suffers only one design drawback: it does not enable you to import text files created in word processing applications, except, of course, via the Clipboard.

To my mind, Canvas is the best QuickDraw draw program on the market, better than SuperPaint and far better than MacDraw. But its most exciting advances are the precision drawing functions, which should appeal to engineers, architects, and artists who have had to rely on 2-D CAD programs for accuracy and style. Canvas provides a Smart Mouse feature that constrains the movement of the mouse according to predetermined specifications. For example, you could set a constraint that alerts you when a line reaches exactly 1 inch in length. You could then turn around and change that constraint to 2 inches. A Smart Mouse constraint can also affect the appearance of the cursor, so the cursor changes to indicate the nature of the constraint. If a constraint applies to existing elements—for example, when the cursor aligns vertically and horizontally with two points in the current drawing—dotted source lines connect the cursor to the elements, so you can visually align a new object to a structured image (see "This CAD Is a Charmer").

Canvas also offers 15 dimensioning tools that automatically label an object according to its length, angle, radius, or diameter. You can also label the area or perimeter of an object using a pop-up menu. You define the unit of measurement using a scalable ruler. Canvas 3.0 fully supports common CAD formats on the IBM PC, including CGM, DXF, and IGES, and can even open MacDraw files.

Predictably, all these enhancements make Canvas a little top-heavy. The program has 48 tools and 240 commands. Clicking on a tool reveals a pop-up menu of other tools, some of which produce pop-up menus of their own. Options that affect a standard operation (such as printing) can be found throughout all kinds of seemingly unrelated dialog boxes.

But while there's little doubt that Canvas 3.0 would have benefited from a more thoughtful design, the program has an immense feature list. If you're willing to pay your dues discovering its complex nuances, this is one draw program that will never let you down.—**Deke McClelland**

See **Where to Buy** *for contact information.*

Integrated Application

GREATWORKS 1.0

Pros: Strong word processing; good spreadsheet and outlining modules.
Cons: No hot links between modules (except Chart); weak telecommunications.
Company: Symantec Corporation.
Requires: Mac Plus. Recommended: Hard drive. **List price:** $299.



Since its release in 1988, Microsoft Works has been the dominant player in the integrated software market, but recently three products have been announced to challenge Works. Claris's ClarisWorks and BeagleWorks from Beagle Bros. haven't shipped yet, so the first release comes from Symantec. GreatWorks includes eight modules: a word processor; an outliner; a spreadsheet; and chart, database, draw, paint, and telecommunications applications.

At the CORE

Tying together the eight GreatWorks applications is the CORE (Cooperative Resources) Technologies, a shared group of text, graphics, and help fea-

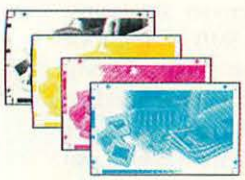
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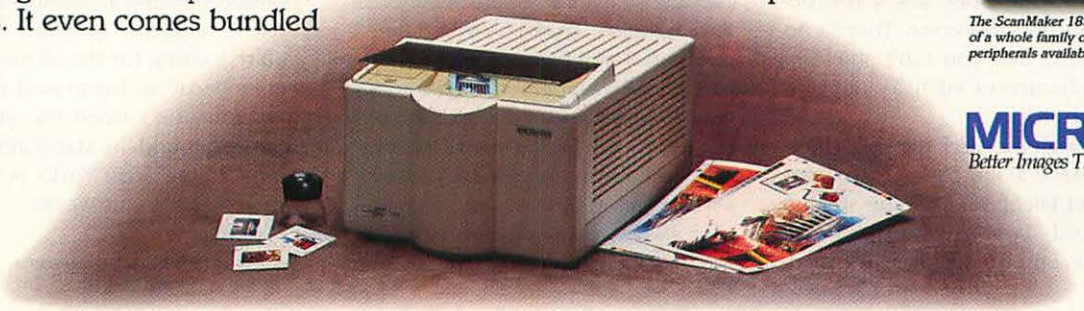
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Circle 63 on reader service card

tures that work in all of the modules—except Communications, which uses only the help feature.

The CORE Technologies also include Microlytics' SpellFinder (a 100,000-word spelling checker) and WordFinder (a thesaurus), which are available in all modules except Chart, Paint, and Communications. In addition to the online help system, GreatWorks also uses System 7's balloon help feature.

GreatWorks uses APDA's XTND file-sharing technology, which provides file translators for a variety of other programs. The package includes translators for 22 Mac and PC file formats. Most of these translators were licensed from Claris; 8 were written by Symantec. Unfortunately, the translators don't work in both directions. For example, you can import an Acta outline into a GreatWorks Outline, but you can't export a GreatWorks outline to Acta. Sharing files would be much easier if all of the translators worked both ways.

Integrated Modules

Outline adds advanced features like extensive text-formatting to the basic outlining features (move, expand, and collapse topics). Outline also offers six types of topic label formats, including Legal and Harvard, and it can read and write files from Symantec's More 2.X and 3.X.

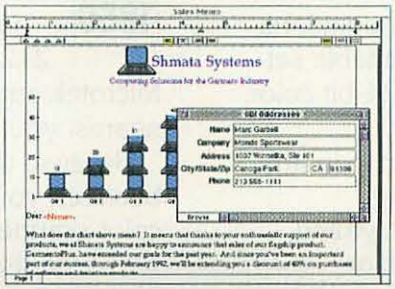
The word processor is the centerpiece of any integrated package, and GreatWorks' Write has some surprises. Multiple columns, multiline headers and footers, and left and right pages are features usually found in stand-alone packages. You can create custom text styles, which are added to the Text menu and are assigned ⌘-*key* equivalents. Text copied into Write from other GreatWorks modules retains its original format. You can do a print merge, using data from Database. Write does lack a few desirable features, however. There's no word count, and you can't show invisible characters such as tab and paragraph marks.

Although they lack the sophistication of stand-alone packages such as Excel and FileMaker Pro, the spreadsheet and database modules are complete. Spreadsheet has 103 calculation functions, which are shared by Database. Spreadsheet allows good control over type and column format and includes the standard spread sheet operations. Chart allows you to create two-dimensional charts based on the spreadsheet cells selected, and you can use pictures in column and bar charts. Charts can also be manually updated from changed spreadsheet data.

Database is a simple file manager, and its design and operation is reminiscent of the original versions of FileMaker. Field types include calculation, picture, summary, and time, as well as text, number, date, and memo. You can create any number of forms, and Database includes some built-in formats, such as three-up mailing labels and columnar reports. The draw module tools are available in Database for form design. Database files are disk-based and indexed automatically.

The draw and paint modules do not skimp on features, but they do not include any remarkable features. Draw supports 256 colors and has the usual drawing tools. Paint works fine, but only in black and white.

The communications module is the weakest. It's a bare-bones terminal emulator. Communications uses the Apple Communications Toolbox, which is built into System 7 and installed as an INIT under System 6.0.X. Apple intended the Communications Toolbox as a framework that developers would build on, adding functionality and value. Unfortunately, Symantec hasn't added much to Apple's work. The Communications Toolbox comes with TTY and VT102. Communications lacks any macro or scripting capabilities. It supports only Xmodem file transfers, no Ymodem or Zmodem. Incoming text does not scroll smoothly onto the screen; text appears in bursts, which takes some getting used to.



Mixing Applications Creating this document required most of the GreatWorks modules. The computer icon was created in Paint, then colorized in Draw, where the logo text was added. Sales figures in Spreadsheet were the basis for the picture chart, which also uses the Draw icon. The Draw and Chart elements were then pasted into Write, which is preparing for a print merge from the GW Addresses Database file.

So, Is It Great?

The GreatWorks manual includes a good tutorial and ample information about the program's features. Symantec provides technical support forums on CompuServe and America Online, and phone support by a toll call to Jacksonville, Florida, during business hours. The quality of technical support was spotty; I called three times and, once when I asked about installing the Communications Toolbox under System 7, I failed to get a satisfactory response. On the positive side, the support reps were pleasant and answered the calls promptly.

GreatWorks still has room for improvement. When running in a partition with 1MB of RAM, performance slowed noticeably with more than two or three documents open, especially Draw or Chart documents. Write doesn't always redraw the screen properly in low-memory situations; you need at least 1.5MB of free RAM available to run the program comfortably. Chart is the only module that can have hot links to other modules. System 7's AppleEvents and publish and subscribe are not supported in this version. A Symantec official indicated that future versions of GreatWorks would support these features. I would like to see a macro capability added, especially in Communications, and color paint would be appropriate.

The main question is whether GreatWorks measures up to the competition—Microsoft Works—and it *is* clearly superior in many ways. If you're looking for the all-in-one convenience of an integrated package, and you don't need the advanced features found in stand-alone programs, then GreatWorks is a better buy than Microsoft Works.

—Tom Negrino

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Interactive Videodisc

THE LOUVRE, VOLUMES I–III

Pros: Thousands of works of art; excellent HyperCard interface; informative texts. **Cons:** No manual; video reproductions could be clearer. **Company:** The Voyager Company. **Requires:** Mac Plus; hard drive; HyperCard 2.0 v2; System 6.0.5 (System 7–compatible); computer-controllable videodisc player; cable or Voyager's adapter box; standard television. **Price:** Volumes I–III $99.95 each; HyperCard Companions $99.95 each; The Louvre Compendium $295 (includes HyperCard Companion).



Take 30,000 slides of 4500 works of art and antiquities in Paris's Louvre museum. Now add essays on everything from Sumer to symbolism, along with an array of historical time lines, artists' biographies, indexes, maps, and glossaries. What have you got? The raw material for an art encyclopedia maybe, or a librarian's nightmare.

But put the slides on a videodisc, put the art-history data on a Mac floppy disk, and add a HyperCard interface that lets you jump from image to image and free-associate through the texts at the speed of thought (or at least of a spinning drive). *Now* you have something special: Voyager's Louvre series of interactive videodiscs—a coffee-table book–cum–cultural database that's as entertaining as it is educational.

Whole Lotta Louvre

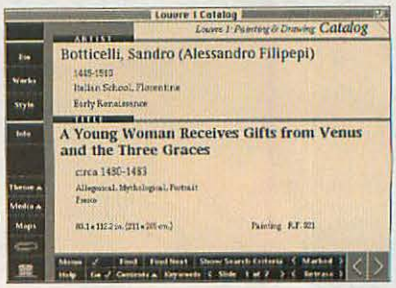
Voyager's virtual museum contains a healthy share of the Louvre's major works of art—60 to 70 percent, according to one of the project's creators—along with many rarely displayed sketches and other, smaller pieces. Volume I, Painting and Drawing, includes 18,000 still-frame views of 2400 works. Volume II, Sculpture and Objets D'Art, offers 5000 frames of 970 pieces. Both discs deal exclusively in European works dating from the Middle Ages to the mid-nineteenth century. Volume III, Antiquities, draws from the Louvre's store of antiquities; its 6000 frames represent 1180 Egyptian, Near and Middle Eastern, Islamic, Greek, Etruscan, and Roman works.

In addition to stills, each disc contains 23 motion-video sequences highlighting significant pieces. These minute-long clips serve as a docent's introduction to the collections.

The Companion stacks vary for each volume. The Painting and Drawing stack focuses on art history, featuring essays on different periods and styles, discussions of topics like genre painting and allegory, and biographies. The antiquities Companion is more archaeological, with maps, histories of civilizations, and a glossary that explains things like who Ramses II was, what a hoplite is, and what went on at a bacchanalia. (The Volume II Companion should be out by the time you read this.)

The well-thought-out Companion interface design encourages trains of thought that go as far as your curiosity takes you. By simply pushing buttons or clicking on hot text, for example, you can easily move from a painting that catches your eye, to views of all the paintings on file by that artist, to a biography of the artist, to a biography of the artist's teacher, to a menu that lets you sample the teacher's oeuvre and judge the influence for yourself, to an essay and slide show on the artistic movement both teacher and pupil were part of, to a menu of work by other artists who practiced that style, to . . . wherever. You can climb from the particular to the general, spiral in the opposite direction, or move laterally to, say, sample all the landscape paintings or works on paper. This type of hypertext hopscotch makes learning an adventure—instant informational gratification.

The Companions include a word-search facility that lets you locate works based on standard criteria like title or date as well as by keywords that the Companion creators have assigned to each piece. Keywords let you do things like find pictorial elements that may not be mentioned in a work's title (birds, bagpipes, beheadings) or locate items according to more-abstract descriptions (scenes from *Orlando Furioso*).



Treasure Hunt This catalog card is actually your ticket to explore Voyager's Louvre videodisc. Click on virtually any word to call up a piece of art, an essay, or a menu that offers even more ways of hunting through the material.

One for the Permanent Collection

I do have some criticisms. The video images are often a bit murky, a failing the multiple detail views of each piece don't entirely amend. The Companions don't include written manuals; although the balloon help is excellent, no online help is that good. And I often wished there were more information about the individual pieces of art. I should also mention that, overall, Volume III isn't as satisfying as Volume I, which contains twice as much art and information.

These quibbles notwithstanding, libraries and all levels of schools that have the required equipment will definitely want to add Voyager's Louvre to their videodisc collections. At schools with students too young to explore by themselves, teachers can use the Companions' Slide/Video Show and Memo features to arrange material for annotated presentations. Individuals, of course, might also be interested in this package, but if you know a lot about art, you'll probably find the information in the Companions a bit elementary. Scholars and other knowledgeable art lovers should consider the Compendium, which includes all 30,000 stills from the three volumes along with some stripped-down software.

Multimedia always has a way of making people spout futuristic pronouncements. True to form, I'm prepared to make an astonishing prediction: if The Louvre is a digital coffee-table book, it's a coffee-table book I can guarantee will actually get read. Now that is something new under the sun.—**Joe Matazzoni**

See **Where to Buy** *for contact information.*

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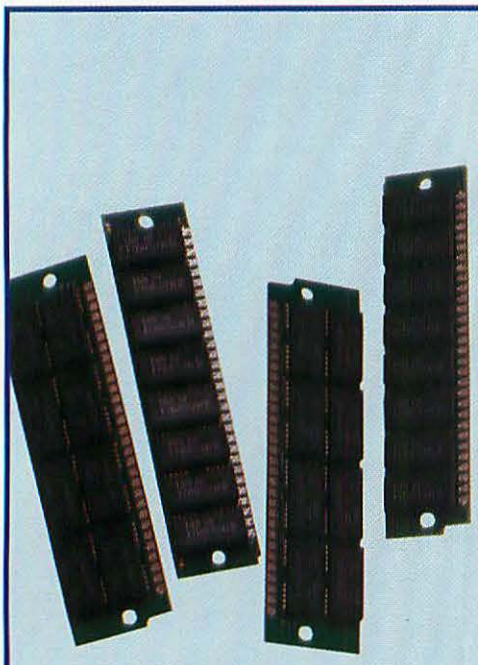
Capcity	External		Internal	
	Segate	Quantum	Segate	Quantum
40+MB	$379	n/a	$289	n/a
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- CD-ROM Reader CDR-36 w/o I/F*24636* ~~$430~~ - $399
- CD-ROM Reader CDR-73 w/o I/F*24634* $634
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- TurboFloppy 1.4*24741* ~~$308~~ - $299

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- ES-300C Color Scanner w/ I/F 22765 $1824

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- M150 Mac Portable.....*22855* $399

Logitech
- ScanMan 32 22751 $289

Relisys
- Tefax RA2110.....*22700* $895

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- Label Printer 22852 $189

Microtek
- Microtek.....22755 $1670

Seikoska
- Personal Printer 22857 $235

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- DataLink/Mac Portable*22308* ~~$209~~ - $180

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- MacCon+ IIE thk/thn 22538 ~~$269~~ - $229
- MacCon+ SEE thk/thn*22525* ~~$272~~ - $230
- MacCon+ 30iE thk/thn*22526* ~~$272~~ - $259

Dayna Communications
- DaynaPORT E/30-T.....22545 ~~$285~~ - $269
- DaynaPORT E/II 22546 ~~$285~~ - $259
- DaynaPORT E/si-T.....*22551* ~~$285~~ - $269
- EtherPrint*22541* $349

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- PhoneNET® Connector Din-8.....*22513* $31
- PhoneNET Din-8 to RJ11, 10pk.22534 ~~$215~~ - $199
- PhoneNET StarConnector™ 22512 ~~$27~~ - $18
- PhoneNET StarConnector 10pk.....*22515* $129
- PhoneNET StarController®*22516* $898

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- Teleport/Fax 22314 ~~$195~~ - $185
- Teleport Modem 22311 ~~$145~~ - $135

Interex
- LocalTalk connector Din-8 to Din 3.....*22521* $32

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- Protegé 2400 External w/ SW.....*22315* $99
- Protegé 2400/SendFax 9600 w/ SW*22316* $119
- Protegé V.42bis external, w/ SW*22317* $169

Nuvotech
- Nuvolink SC*22535* $369

Outbound
- Pocket PortModem.....22319 ~~$259~~ - $180

Shiva
- Telebridge 22506 $249

Technology Works
- Mac II/10t Ethernet Kit*22540* ~~$249~~ - $220

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- SE/30 8-Bit 640X480.....*23541* $345

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- Pivot Display for Built-in Video.....22028 $895
- Pivot II Interface.....23572 ~~$319~~ - $279
- Pivot LC Interface.....*23571* ~~$319~~ - $279
- Pivot SE/30 Interface.....*23570* ~~$319~~ - $279

RasterOps
- RasterOps 24XLi*23561* $2649
- RasterOps 8XLi*23560* ~~$1879~~ - $1499
- RasterOps 24Si.....*23559* ~~$679~~ - $649
- RasterOps 24STV*23568* ~~$1299~~ - $1269
- RasterOps 264/SE30*23539* ~~$669~~ - $639

Precision Joystick



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Mousestick ADB
(Advanced Gravis)*25286* $62



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Sigma
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- 4 X 1MB SIMM IIfx 25484 $209
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- Turbo Mouse Plus 25280 $107

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- 3.5" Diskettes DS, HD Formatted 10Pk 25881 $25

American Power
- UPS 110SE 26292 ~~$207~~ - $170

Applied Engineering
- QuadraLink 26917 $205

InnovativeTechnology
- The Library (black) 26905 $14
- The Library (grey) 26903 $14

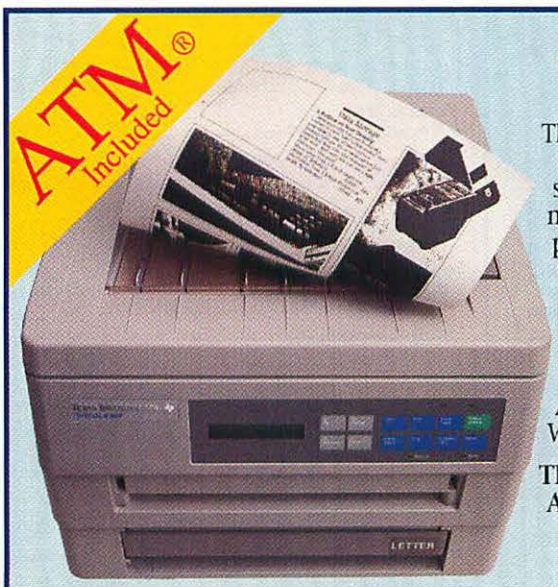
Kensington
- Apple RGB Anti-Glare Filter 26891 $64
- Mac Classic Anti-Glare Clip-on Filter 26924 $53
- System Saver Plus, Beige 26888 $64

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ScanMan Model 32 (Logitech) 22751 - $289



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TI microLaser w/ Adobe Type Manager
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WristMac
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Farallon Computing
- MacRecorder 23730 $156

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- MacSpeaker 26923 $179

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After Dark is the ultimate in screen savers. It offers more than 25 provocative images, including underwater scenes, lightning storms and nocturnal urban landscapes. More After Dark includes the screen saving images along with an exciting new space game.

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- **More After Dark** 30427 $29

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Aldus
- PageMaker v4.01 29781 $497

Broderbund Software
- Typestyler v1.5 30450 $115

Claris
- Claris MacWrite II v1.1 30586 ~~$142~~ - $139

MacroMind
- MediaMaker v1.0 29914 $509

Microsoft
- Microsoft Word v4.0 30582 $245

WordPerfect
- WordPerfect Mac v2.0 30591 $298

Writing Tools Group
- Correct Grammar v2.0 30633 $49

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- Claris MacProject II v2.5 29741 $366

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- Quicken v3.0 28459 $42

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- Microsoft Excel v 3.0 30181 $307
- Microsoft Office Bundle 30182 $525
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- Microsoft Works v2.0 30581 $194

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- WillMaker v4.0 29888 $37

COMMUNICATIONS SOFTWARE

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- White Knight II 27664 $89

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- Prodigy Startup Kit 27726 $27

Sitka
- MacTOPS Network Bundle 27682 $187

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- **SWITCHBALL** 25183 $98
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MacAvenue Fun Pak II 29410 $49.95

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SimCity v1.2	28678	$29
SimEarth	28764	$45
Carmen San Diego – USA	28676	$29
Carmen San Diego – World	28672	$29
Carmen San Diego – Time	28774	$29
MECC		
Number Munchers	28034	$29
Word Munchers	28036	$29
Simon & Schuster		
Typing Tutor	28008	~~$28~~ $24
Spectrum Holobyte		
Tetris	28606	$22
Ventana Press		
The System 7 Book	27512	$19.95

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Adobe		
Illustrator v3.0	29789	$378
Photoshop v2.0	29267	$539
Aldus		
FreeHand v3.0	29785	$388
Persuasion v2.0	29782	$327
Broderbund Software		
Print Shop v1.3.1	29836	$35
Claris		
Claris MacDraw Pro v1.0	29205	$269
Claris MacPaint v2.0	29202	$92
Deneba Software		
Canvas v3.0	29233	$249
Frame Technology		
FrameMaker Mac	29864	$819
Generic Software		
Generic CADD	29280	$299
Macromind		
Macromind Director v3.0	29216	$674
Macromind Accelerator	29258	$124
Microsoft		
PowerPoint v2.01	29798	$246
Paracomp		
Swivel 3D Professional v1.0	29294	$437

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Virex.....30412 - $59

When the going gets tough, Microcom's 911 Utilities gets your Mac going again. Fast. This collection of utilities examines files, retrieves lost information from files and disks (1stAid), recovers deleted files (Complete Undelete), finds and removes viruses (Virex) and isolates bad disk sectors (Sector Collector.)

911 Utilities.....30550 - $89

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SuperPaint v 2.0	29222	$134
Symantec		
THINK C v5.0	27587	$194

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Adobe Type On Call	30560	$59
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After Dark v2.0	30425	$29
Central Point		
Mac Tools Deluxe v1.2	30364	$79
Fifth Generation		
Suitcase II v1.2.3	30402	$49
SuperLaser Spool v2.02	30388	$92
GDT		
PrintLink Collection (Serial) v4.0	30448	$58
Symantec		
Norton Utilities v1.1	30460	$84
SAM v3.0	30343	$68

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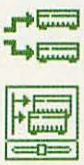
Disk-Mirroring Systems

DISKTWIN 2.0

Pros: Easy to use; transparent operation; supports multiple drive pairs; can mirror, or twin, several drives to a single larger drive; partitions for twinning are individually selectable. **Cons:** Drives must be resynchronized any time twinning is interrupted; documentation needs work; expensive. **Company:** Golden Triangle Computers. **Requires:** SE/30; System 6.0.4 (System 7–compatible); second hard drive. **List price:** $999.

TWINIT 1.0

Pros: Simple to use; transparent operation. **Cons:** Drives must be resynchronized any time twinning is interrupted; supports only one pair of drives; can't twin selected partitions; manual needs minor work; expensive. **Company:** Golden Triangle Computers. **Requires:** Mac Plus; System 6.0.4 (System 7–compatible); second hard drive. **List price:** $249.



Backing up your files at the end of each day is a good prophylactic practice, but what if a drive crashes at 3 p.m.? All the work you've done so far that day is lost. Worse, think of the impact on your business if your file server crashes and you have to bring down the entire network until the data is restored? For situations such as these, Golden Triangle offers two continuous-backup solutions: TwinIt, a cdev; and DiskTwin, a NuBus-board-and-software combination.

Twinning: What's It All About?

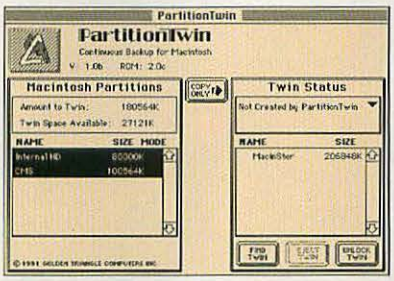
Both systems are based on disk mirroring, which requires connecting two hard drives—a primary and a twin—in a normal SCSI chain. If the drives have different capacities, the larger one must be designated the twin. Then the two must be synchronized, which creates an exact duplicate of the primary drive on the twin—same files, same icons, same organization (any additional storage space beyond that of the primary drive disappears).

Once the drives are in sync, any changes that you make to the primary drive—deleting files, creating new ones, or modifying existing ones—are instantly carried out on the twin drive. Then if the primary drive crashes, it's a simple matter to replace it with the twin.

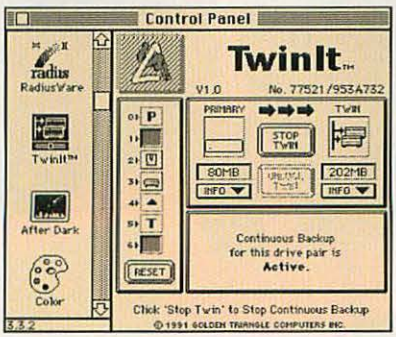
Different Needs, Different Versions

TwinIt works on any Mac from the Plus on up. As a software-based solution, it has a few limitations. First, it works with only one primary-and-twin-drive pair. Second, if the primary drive crashes, you must manually mount the twin in order for it to take over. Downtime, although relatively short, is unavoidable. For greater flexibility you need DiskTwin.

DiskTwin consists of a Mac II or SE/30 NuBus board, several applications, an INIT, and a cdev. The board acts as a second SCSI port to which several twin drives can be connected. DiskTwin also has an option called automatic cut-over that allows the twin to replace the primary drive instantly in the event that the latter fails—a godsend for network managers worried about downtime. If the drive failure is accompanied by a system crash, however, this feature doesn't function and you have to change over manually.



PartitionTwin The PartitionTwin application included with DiskTwin shows that I currently have two partitions (each a complete hard drive) being twinned to a single MacinStor hard drive. In Copy Only mode, I can make quick archival copies of a designated primary drive or selected partitions. This option makes most sense when one of the twins is a removable hard drive.



TwinIt Control Panel Device All TwinIt operations are performed from the Control Panel. After choosing the primary and twin drives, synchronization of the pair is only a button click and a few minutes away.

Danger! Danger!

Regardless of whether you choose TwinIt or DiskTwin, keep in mind that anything that happens to a primary drive automatically happens to its twin as well—a mistakenly trashed file, for example, or a virus infection. Therefore, disk mirroring should be supplemented by a backup-and-archiving program. If you ever need access to a file that's no longer on your hard drive, you'll need a true backup. If you're using a removable hard drive as the twin, you can use twinned cartridges as backups. But at approximately $70 per cartridge, this kind of archive gets expensive, particularly compared with a tape backup. Plus, since a twin drive cannot be smaller than a primary drive, you generally can't use the removable option unless you select partitions for twinning, rather than twinning the whole drive. Only DiskTwin supports this method.

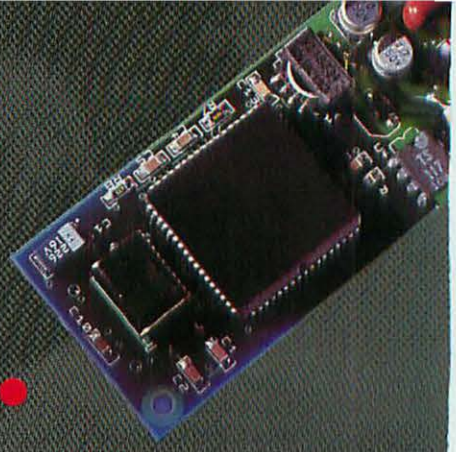
If you need to mount a twin drive, either to check its contents or to use it, you must first use the supplied software to halt twinning. Restarting the process requires that the drives be completely resynchronized, which takes as long as the initial synchronization. The faster the drives, the faster the synchronizing; it took between four and five minutes to synchronize my 80MB internal hard drive and a 200MB MacinStor twin. With normal use, however, resynchronization should seldom be needed.

Documentation Faux Pas

Not everything you may need to know is included in the manuals. Here are a few tidbits I gleaned from Golden Triangle's tech support. If a primary drive has been partitioned, check the partitioning software's manual to see whether it creates hard or soft parti-

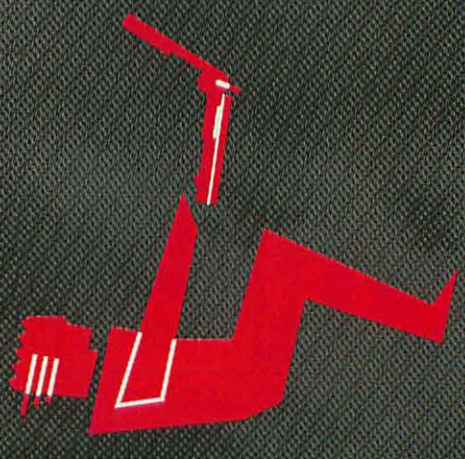
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Circle 43 on reader service card.

tions; DiskTwin supports only hard partitions. Second, TwinIt and DiskTwin can perform a snapshot backup of a primary drive or partition, but only the DiskTwin manual explains how to access that function. A handy program called TwinFormatter that comes with DiskTwin isn't discussed either. Future releases of the software should ship with a Read Me file discussing these points.

Silent Partner

Both TwinIt and DiskTwin worked quickly and unobtrusively on my Mac IIci. The only clue I had that they were operating was the twin drive's light coming on whenever I made changes to the primary drive. And although not marketed that way, either product may be better than nothing for users too lazy to back up regularly. The mirroring packages don't automatically create archival backups, but at least users always have an exact and current copy of their hard drive.

—Steven A. Schwartz

See **Where to Buy** *for contact information.*

Entry-Level Word Processor

THE WRITING CENTER

Pros: Provides basic word processing features with good graphics integration; includes 220-image clip art library; inexpensive. **Cons:** No footnote feature; limited page-layout capabilities. **Company:** The Learning Company. **Requires:** Hard drive; System 6.0. **List price:** $89.95.

The Learning Company's The Writing Center is an easy-to-learn, easy-to-use, entry-level word processor with two types of user in mind. Aimed primarily at students from age 7 on up, it is well suited for producing book reports and essays (augmented with entertaining graphics), and it acquaints kids with the practice of using computers for schoolwork. The program also targets adult casual users who produce correspondence, fliers, and organization newsletters. In practice, all but the simplest newsletters prove to be too taxing for the software.

The Writing Center's easy approach to word processing is evident right from the start. For instance, the program's opening screen lets you click on icons to choose a single-, double-, or custom-column page format, and to make room for page headers. The Writing Center then builds your document made to order, sparing you the hassle of tinkering with page dimensions or column and header settings, which you might face in other applications.

In other respects the Writing Center behaves much like a standard Macintosh word processor, with all the basic features—and then some—for writing and formatting text. Among its more notable assets is a 100,000-word spelling checker that offers intelligent suggestions and accepts additions to its dictionary. The package also includes a discount coupon for Microlytic's excellent WordFinder electronic thesaurus.

Dressed-Up Documents

On the graphics side, the Writing Center lets you place PICT and Scrapbook-imported graphics anywhere on the page, where you can easily resize, crop, or rotate them by 90-degree increments; text automatically wraps around rectangular frames. The Writing Center ships with a library of 220 color PICT images arranged by themes such as Animals, Nature, Science, Food, History, Geography, School, Holidays, Sports, and People. Some of the art is hokey, but kids will appreciate being able to feature Abe Lincoln and the Apollo spacecraft in their school reports.

The bad news is that the program lacks a footnote feature. Students, for whom footnotes are a fact of life, have to either manually position notes at the bottom of the page, which is tedious, or settle for using endnotes, which the program supports. This shortcoming aside, The Writing Center makes a worthy package, particularly by including an easy, 70-page guide to research and report writing for young people.

Know Your Limits

Adults may find the program handy for producing simple, nonacademic documents like correspondence, garage-sale fliers, and greeting cards. The company claims The Writing Center is capable of handling newsletters, but consider some of the drawbacks before you purchase the program for that purpose.



Layout Junior The Writing Center combines the basics of word processing with some modest page-layout features such as multiple columns and graphics importation. The package includes a library of 220 thematically arranged color PICT images to spruce up documents.

The program has no leading controls, only options for single and double line spacing. Also, you can't create and position separate text blocks, which makes placing headlines and captions tricky. If your text loses lines above a heading, that heading moves up. Text columns only flow sequentially; you can't force the flow to another column or page without passing through all columns in between. Page numbers can only be printed at the bottom center of pages; there is no provision for footers. Encapsulated PostScript, a popular format for clip art, is not accepted. And creating rules and column hairlines is clumsy.

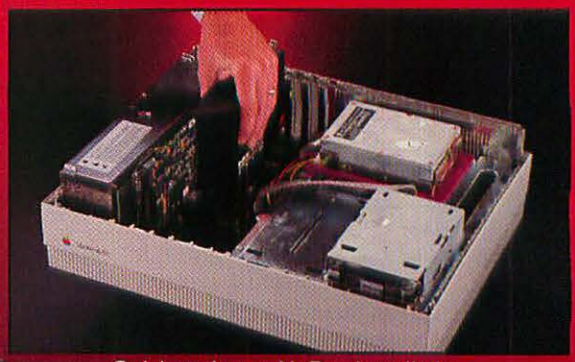
With all these deficiencies, The Writing Center won't manage even modest page-layout projects without causing quite a bit of frustration. A more adept program, such as Timeworks' Publish It Easy or Delta Point's Taste, is more suitable.

For simple word processing, however—young writers' projects in particular—The Writing Center does the job, and at $89 the price is certainly right. In a world where word processors are becoming increasingly complex, expensive, and otherwise too bloated for modest writing needs, this package has a clear place.

—Helmut Kobler

See **Where to Buy** *for contact information.*

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Circle 5 on reader service card

PostScript Laser Printer

HP LASERJET IIIP POSTSCRIPT PRINTER WITH APPLETALK

Pros: Sharpest text output for the money; uses reliable Canon LX print engine. **Cons:** Very slow; paper tray holds only 50 sheets; System 7 drivers shipped on high-density disks. **Company:** Hewlett-Packard. **List price:** $2495.

It was the best of output, it was the worst of times. Hewlett-Packard's LaserJet IIIP Printer gives the best-looking text I've seen from an under-$3000 laser printer. The LaserJet IIIP is also one of the slowest under-$3000 laser printers available.

The $2495 LaserJet IIIP PostScript Printer with AppleTalk is the latest member of the LaserJet family, which currently includes the flagship $3395 LaserJet III PostScript Printer with AppleTalk; the $4895 LaserJet IIID PostScript Printer with AppleTalk, which can print on both sides of a sheet of paper (duplex printing); and the sizzling $6995 LaserJet IIIsi Printer for the Macintosh, which does duplex printing at 17 pages per minute. Every LaserJet III except the IIIsi is among the slowest in its price range.

The LaserJet III printers also share a desirable trait: HP's Resolution Enhancement technology (RET), wherein a custom chip finely controls the printer's laser to vary the size and position of toner dots in a way that smooths the jagged edges of text and line art. HP's RET started the sharper-image trend in which several printer vendors—most recently Apple and QMS—are now participating (see "High-Performance Printing," *Macworld,* December 1991). But the LaserJet IIIP is the first personal laser printer to offer enhanced output.

If only it weren't so slow. The IIIP isn't too sluggish when printing simple documents containing only a few fonts, and it is considerably faster than its unenhanced predecessor, the LaserJet IIP. But if you use numerous downloadable fonts or print scanned images or PostScript illustrations created with programs such as Aldus FreeHand, you pay for first-rate output with time.

A Trusty Engine

The LaserJet IIIP uses the Canon LX print engine, the same 300-dpi mechanism used in Apple's Personal LaserWriter NT and LS and in the QMS-PS 410. The LX engine is available with or without a 250-sheet paper cassette. Without the cassette, the printer holds just 50 sheets of paper, meaning frequent feeding sessions. Apple includes the 250-sheet cassette in its Personal LaserWriter NT, but offers it as an option for the Personal LaserWriter LS. QMS and HP also offer the cassette as an option; HP's is $195.

Setting up the 22-pound LaserJet IIIP is a breeze. Yank out the plastic spacer that protects the printer's engine during shipping, and then slide in the toner cartridge. Slip in the eight-track-tape–size cartridge that endows the printer with PostScript, and you are done. The IIIP is now available in a Macintosh configuration.

The LaserJet IIIP for the Mac also includes a set of disks containing a customized version of Apple's LaserWriter PostScript printer driver. The customized version adds options to the Print dialog box that let you adjust or disable the printer's RET. You can also do this with the printer's easy-to-use front-panel buttons and status display. The customized driver also enables you to switch between the 50-sheet tray and optional 250-sheet cassette during a print job.

TOM GIBSON



HP LaserJet IIIP PostScript Printer with AppleTalk

To HP's credit, the IIIP includes modified drivers for both System 6.0.X and System 7. But the System 7 drivers come on high-density disks, the kind designed for Apple's SuperDrive floppy disk drive—the kind older Macs can't read. If you have an older Mac, you can call HP's Personal Peripherals Assistance line (208/323-2551) to receive 800K disks. Or borrow a SuperDrive-equipped Mac and copy the drivers to 800K floppies yourself. You can also use Apple's standard LaserWriter driver to print to the IIIP, but you lose the ability to adjust resolution enhancement by using the Print dialog box.

Sharp but Slow

Regardless of whose driver you use, printing complex PostScript illustrations takes a long time. In one of my tests, the LaserJet IIIP took five times longer to print an Aldus FreeHand document than did Epson's spry (but not resolution-enhanced) EPL-7500, which retails for just a few hundred dollars more.

Still, print quality yields the sharpest-looking text and line art you'll see at this price range. You need a magnifying glass to tell the difference between IIIP output and that of Apple's new LaserWriter IIg or IIf—which both boast Apple's new FinePrint enhancement technology. But unlike Apple's new printers, the IIIP—like the rest of the LaserJet III family—does nothing to improve the quality of printed gray-scale images.

If you are producing camera-ready artwork and you can afford to wait, consider the IIIP. The IIIP is also a reasonable choice for offices that use IBM PCs, since it does not just emulate an HP LaserJet, it *is* one. But if performance is more important than output quality, consider a personal printer from Apple, GCC, QMS, Epson, or Texas Instruments instead (see "Personal Page Printers Arrive," *Macworld,* May 1991). You might also consider NewGen Systems' $2995 TurboPS/400p, a PostScript clone.

Perhaps Apple will update its LaserWriter NT to incorporate the FinePrint technology. Until then, the LaserJet IIIP is the only way to get enhanced resolution and true Adobe PostScript for less than $3000.

—Jim Heid

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Educational Game

SWAMP GAS VISITS THE UNITED STATES OF AMERICA

Pros: Entertaining; multiplayer options; colorful graphics and sound effects. **Cons:** Limited multiple-choice drill; no teacher mode; hides menu bar. **Company:** Inline Design. **Requires:** Mac Plus; Mac LC for color; System 6.0.5. **List price:** $49.95.

I learned U.S. geography from the backseat of the car on family vacations, studying the road map, and marveling at how long it took to connect the dots. My kids travel at least as much as I did, but they log most of their miles 35,000 feet in the air, which makes it hard to form a clear notion of the difference between North Carolina and North Dakota. Swamp Gas Visits the United States of America is helping them fill in the gaps in their mental maps.

Who Is Swamp Gas?

Swamp Gas is a cartoonish extraterrestrial visitor in a tiny spaceship (he takes his name from the Air Force report that explained UFO sightings as weather balloons, plastic dinnerware, exotic birds, strange cloud formations, and swamp gas). At the beginning of each game, an animated mother ship unloads Swamp Gas somewhere in the United States. His mission is to seek out and identify several different U.S. geographic locations before time runs out.

The player moves Swamp Gas's ship from location to location by clicking on adjacent nodes of a network of flight paths. The ship also has a limited number of "warp" drives that instantly transport Swamp Gas to any state on the map. Each time Swamp Gas reaches one of the mission-critical locations, the player is asked to select its name from a list of four choices. Choosing a wrong answer moves Swamp Gas back one step; selecting a correct response checks the location off on the mission list and allows the player to continue to the next destination. Upon completing the mission, Swamp Gas is picked up by the mother ship, where he can relax in the Alien Arcade.

And What Does He Want?

The game offers a number of customization options. For example, players can play alone or compete in a multiplayer version that lets them take turns controlling individual ships and collecting points. Players can also determine the length of their missions, from 5 to 50 destinations. In addition, the program offers three game levels. At the beginner and intermediate levels, mission destinations are limited to states and capitals; advanced players can add major cities and landmarks to their itineraries.

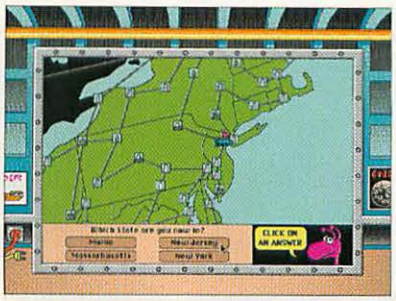
A Close Encounters option adds an element of surprise to the game by occasionally throwing random questions at players. Here's a typical close encounter: *A skunk jumped in your saucer. To get him out, answer this question correctly: Which of the following is true of the state of Wisconsin? 1) The island of Manhattan lies directly east of this state. 2) Davy Crockett was elected to the U.S. Congress from this state. 3) It is known as "America's Dairyland."* Occasionally this produces some silly questions. When we were asked which is true about Georgia, one of the options was "It lies directly west of Georgia."

Teachers and parents might argue that the program makes it too simple for children to select options; a password-protected teacher mode might ensure that kids play at the appropriate level. Another shortcoming: unlike many other educational games, Swamp Gas has no option for adding to or customizing the game's data.

It's a Gas!

My highly trained crew of young software testers had lots of fun playing Swamp Gas. They loved the colorful animation, the imaginative sound effects, and the cartoonlike quality of the game. Younger kids needed some help from oldsters at first, but when they discovered the Help feature they were able to go it alone.

While the kids enjoyed the geography game, they were even more enthusiastic about playing Nerdoids, Stink Snakes, and Quazar Klutzes in the Alien Arcade. These games resemble the arcade classic Space Invaders, but the plot lines have been reworked so as not to offend those who object to shoot-'em-ups. For instance, as Nerdoids try to reach the computer room, they pelt you with calculators and pocket protectors. To get rid of the Nerdoid, hit him with a comic book; he will go away to read it, leaving you alone. You get the idea.



Where Is Swamp Gas? By answering multiple-choice questions like this one, Swamp Gas collects geographic knowledge and game points during his cross-country mission.

When considered strictly as entertainment, Swamp Gas doesn't measure up to the top Macintosh games. As a learning environment, Swamp Gas isn't as rich as the best educational programs. But as an educational game, Swamp Gas scores. My son Ben, whose knowledge of computer games far exceeds his mastery of American geography, says "It may not be state of the art, but it gets the job done and it's fun!"—**George Beekman and the Shoobedoobop Software Testing Team**

See **Where to Buy** *for contact information.*

24-Bit Color Scanner

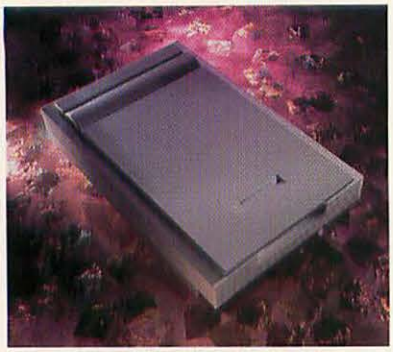
HP SCANJET IIC

Pros: Fast, high-resolution scanner with easy-to-use software; 400-dots-per-inch optical resolution. DeskPaint included. **Cons:** Minor stray-light problems. **Company:** Hewlett-Packard. **Requires:** 2MB of RAM; System 6.0.5; hard drive. **List price:** $1995 (includes interface).

Color scanners for the Mac range from $70,000 professional systems (ColorGetter by Optronics) down to $519 handheld systems (Lightning Scan Pro 256

(continues)

JEANNE STACK



HP ScanJet IIc from Hewlett-Packard

from Thunderware). Hewlett-Packard has now entered the crowded low-cost desktop color-scanner market with a unit that derives some engineering from the company's already successful ScanJet Plus gray-scale unit. The ScanJet IIc is a nice piece of work, essentially the best value of its kind today.

The Works

The ScanJet IIc is a sleek, lightweight (29 pounds) box that connects to the SCSI port of the Macintosh. The scanner uses two fluorescent bulbs and a special charge-coupled device set to perform fast single-pass 24-bit color scans (it took 23 seconds to scan an 8½-by-11-inch *Macworld* cover at 400 dpi). Software includes DeskScan II, essentially a control panel for directing scans, and a version of Zedcor's DeskPaint (see "Point and Shoot"). DeskScan II is a model of interface clarity and could probably be used by any third-grade class with no coaching whatsoever; familiar old DeskPaint is not a bad program, but Adobe Photoshop, which is bundled with scanners from other vendors (Abaton's Scan 300/Color, for example), is more useful.



Point and Shoot Hewlett-Packard's DeskScan II software offers a nice assortment of self-explanatory scanning tools. Color-scanning options have been carefully chosen to enhance the quality of final printed output.

The device itself represents an extreme in electromechanical simplicity, resembling the top half of a desktop copier. With a small lights-plus-optics head on a ribbon cable, the only moving part in the 8½-by-14-inch image path, this machine will easily outlive your Macintosh, even in constant daily use by all hands in a graphics shop. I noted in tests that the copier-style viewing window cover allows stray light to shine in from the sides; for best results on images taken from magazines or books, I covered the unit with a jacket or turned off the room lights.

Photo Engineering

As you might expect from a company that makes more money from printers than scanners, HP has worked through the sequence of operations on scanner data to produce the best printed results. For printing to an HP laser printer or color ink-jet, all calibration has been prepackaged in Print Path settings. For other printers, you can modify these settings and add them to your Print Path choices. The manual includes pages of hints on print optimization, including the frequent admonition that scanning at 400 dpi can make your files huge without improving output.

DeskScan's tools include sharpening and exposure correction for gray-scale and line art, and a useful Spot Color mode that makes it easy to edit single-color areas in artwork. The manual wisely illustrates each feature and interaction with before and after photos, so users who don't know a gaussian transform from gamma correction can get good results in a hurry. Finally, the ScanJet IIc's 400-dpi setting on black-and-white text improves its utility in optical character recognition; Caere's OmniPage software with a ScanJet IIc gives acceptable OCR results even with 6-point Helvetica text.

Hewlett-Packard's ScanJet IIc delivers clean, high-resolution images, and includes software to optimize printed output. This system sets the standard for low-cost Macintosh color scanners.—**Charles Seiter**

See **Where to Buy** *for contact information.*

Texture Products

SCREEN CAFFEINE 1.0

Pros: Diverse texture selection; great Photoshop alpha-channel collection. **Cons:** Usefulness of many textures questionable. **Company:** Neoview. **Requires:** Mac II; 4MB of RAM; color monitor. **List price:** $99.

TEXTURESYNTH 1.1

Pros: Instant access to editable library of texture effects. **Cons:** Fixed number of base-pattern algorithms. **Company:** Pantechnicon. **Requires:** Mac II; color monitor; System 6.0.2. Recommended: 32-bit QuickDraw. **List price:** $149.

WRAPTURES 1.0

Pros: Most images highly useful for 3-D and even 2-D graphics work; great browser interface. **Cons:** File type and creator data need to be changed to open PICS files. **Company:** Form and Function. **Requires:** Mac II; 2MB of RAM; color monitor. Recommended: MacRenderMan. **List price:** $129.

Anyone involved with the production of commercial art, fine art, presentations, and 3-D graphics knows that textures are a part of everyday life. Whether it's a background for a set of slides, a realistic stone texture for architectural 3-D rendering, or a wild pattern for a psychedelic poster, you simply can't have enough useful textures. While color scanners are a great way to get textures into a computer, not everyone has the time to track down usable objects for scanning, much less fine-tune the scans for optimum quality. A variety of precreated texture products are now available. Screen Caffeine and Wraptures offer image and animation files, while TextureSynth actually synthesizes custom textures based on a variety of parameters.

TextureSynth

TextureSynth is a unique visual synthesizer that creates organic-looking textures. The program presents you

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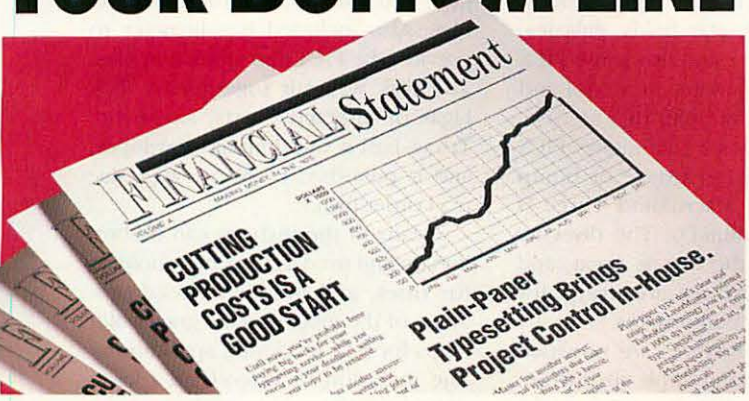
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with two programmable base patterns, or visual waveform generators, that can be overlaid, or modulated, onto each other in different ways, resulting in complex composite textures. The base patterns are mathematical algorithms, not static images, that enable you to easily change the parameters and dial in new variations.

For each of the two patterns you set parameters that control the base algorithm (there are eight built-in base effects, controlled by sliders), cell size, complexity, contrast, amount of fine-grain detail, twist (or degree of rotation), and color mapping. The two base patterns are then laid on top of each other with different "ink" effects, making one texture a mask for the other. By tweaking each parameter, you can generate a virtually endless number of permutations. I was able to quickly create textures resembling crumpled paper, backlit glass bricks, stucco, digital alien acne, and more.

A wonderful aspect of the program is that all the controls work interactively—as you change parameters, the texture changes instantly, without repeating the rendering process. TextureSynth can randomly change parameters and generate new texture variations. If you see a texture you like, you can inspect its parameters and even tweak them to get the desired effect. To constrain the effects of an otherwise wildly random tour through texture hell, you can limit randomization to affect only certain parameters, as well as determine the amount of variation based on a starting texture.

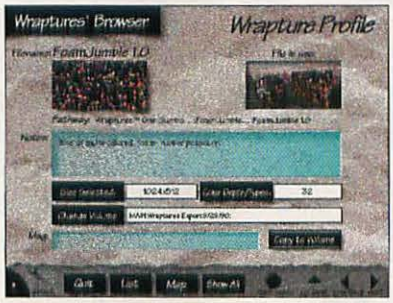
Colors are mapped as shadow, object (or midtone), and highlight values, and you can load different color palettes (each texture can use 3 of 25 colors, with intermediate gradient values of the selected 3 colors generated by the software for smooth textures). You can even change the color of the bumps on a background without changing the background color, or make the shadow values into bright saturation colors.

Effects can be saved into libraries, or *patch lists*. The program ships with two patch lists, which are great for creating your first textures.

Textures can be saved in 8- and 24-bit color PICT and TIFF formats, in either a 256-by-256 tiling format



TextureSynth Variations The texture visible in the background can be modified instantly by changing any of the parameters in the Patch dialog box.



Wraptures' Browser The Wraptures Browser displays the selected texture wrapped onto a sphere and a plane, as well as available sizes and color depths and other comments.

(with seamless edges) or a 640-by-480 format (a full 13-inch screen). TextureSynth patterns tile perfectly but lack the ability to plug in new base algorithms to expand the variety of potential effects. All in all, TextureSynth is a great creative tool for Mac 2-D and 3-D artists. I highly recommend it.

Wraptures

The Wraptures CD ROM consists of more than 100 scanned textures, including stones, woods, tree bark, rock formations, bricks, foliage, metals, fabrics, papers, natural vistas (clouds, sunsets, water), star fields, galaxies, and more. There are also some PICS files (of running water in a pool and in a canal, for example) that are useful for 3-D software that allows PICS files to be used as texture or bump maps (such as MacroMind Three-D and Specular Infini-D). The diversity and quality of the files is great, and most of the textures are useful for both color and bump maps.

Wraptures' textures are provided in PICT format in multiple sizes (from 64 by 32 up to 1024 by 1024 pixels) and screen depths (24-bit, 8-bit adaptive palette, and 8-bit system palette). Most of the textures allow seamless tiling, and the size increments tend to be multiples of two, important for MacRenderMan users. The entire collection of files can be browsed via the gorgeous Browser (created with MacroMind Director), and texture files can be saved (in the desired size and color depth) from within the Browser. The Browser also contains a graphical map of the texture categories, and each texture screen displays the textures mapped onto a sample 3-D sphere and plane, as well as comments (some quite humorous) regarding the origin and usefulness of each texture.

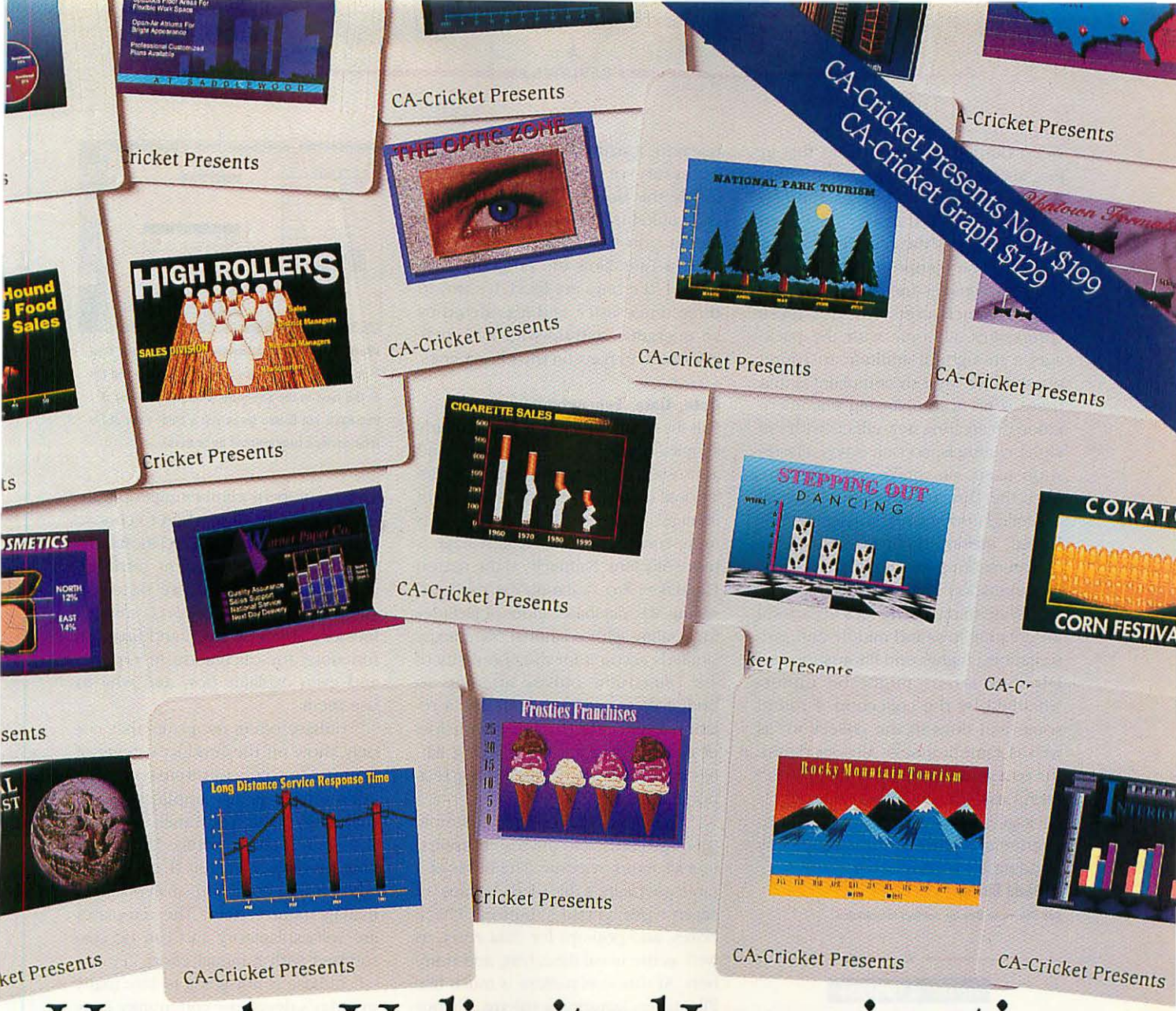
I used the Wraptures textures in a few 3-D programs and liked the results. The sunset and cloud files all worked wonderfully as reflection maps in Infini-D and StrataVision, and Foam Jumble and some of the abstract artistic textures made excellent color maps. But the PICS files had incorrect file type and creator data, which made them unrecognizable as PICS files (DiskTop or any file editor can be used to remedy this problem). Although primarily intended for use as 3-D texture maps, many of the Wraptures files can be used as 2-D backgrounds and picture-composition elements. Add a good image editor like Photoshop, and the fun begins. For most 3-D artists (and many 2-D artists), Wraptures is a great investment.

Screen Caffeine

Screen Caffeine is a CD ROM containing 224 PICT-format texture files (in 32-bit, 8-bit adaptive, 8-bit system palette, and 8-bit desaturated-color formats), 68 Photoshop alpha channels, and 7MB of Director animation files. Also included is a browser to preview the PICT and animation files. The disk was put together by Rick Ligas of Interactive Arts, an Austin, Texas–based multimedia developer, and is published by Neoview, a Mac mail-order firm.

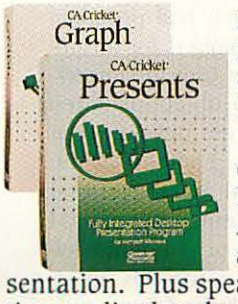
Many of the textures can be broken up and used as tiles, placeholders for titles, and modular backdrops. Many of the images make great color maps for 3-D–rendering applications. The inclusion of video-legal (desaturated-color) versions of the textures is useful for presentations destined for

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video output (it's easy to do this in just about any Mac image-manipulation program, but it takes time to process all 224 textures).

A number of the complex textures appear to be composites of some of the basic images included—and the alpha channels used to create these composites all come with the package, a thoughtful addition to round out the disc. My only complaint is that there is no accompanying documentation on creating new effects with the alpha channels, so only savvy Photoshop users can make use of them. Also, the Director animations are all compiled into MacroMind Accelerator format, making them inaccessible as clip animations for Director. As such, the animation files are useless.

While many of the files are useful for creating low- and middle-end presentations, higher-end Photoshop and Director artists might be underwhelmed by the collection. I found some real dogs in the collection, as well as some stunners. All considered, the couple-dozen textures that I found useful are enough to justify buying this package, and the inclusion of the alpha channels is enough to attract any budding Photoshop artist.

—David Biedny

See **Where to Buy** *for contact information.*

Relational Database

NUBASE FOR THE MAC 1.3

Pros: Preserves the good points of dBase Mac; serious speed improvements; lots of business-application templates; excellent manual, help, and phone support. **Cons:** Single-user only. **Company:** New Era Software. **Requires:** Mac Plus; 2MB of RAM; System 6.0.5; hard drive. **List price:** $295.

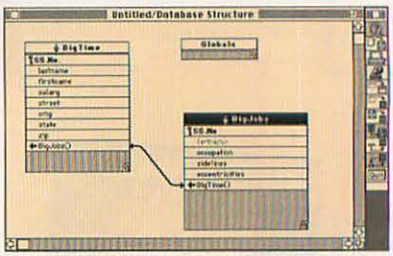
nuBase, to be brief, fixes nearly everything that was wrong with the promising database dBase Mac, released four years ago. If you bought a Classic last month and just started reading this magazine, the history is that dBase Mac offered a particularly simple entry into relational databases. The program's problems were clear. When released, it had 100 to 200 bugs (estimates vary) of differing ferocity. It was nearly the slowest database product you could buy. And buying dBase Mac meant you would be dealing with Ashton-Tate. Now the program is renamed, the bugs are fixed, it's two to three times faster, and it's offered by an energetic start-up with live, well-informed humans on the phone lines.

Data, Data, Everywhere

Flat-file databases are intrinsically fairly simple—a table containing names and addresses is a standard example. Relational databases support a variety of linkages between tables and are thus more complicated, but data storage is more efficient. Simplicity is the reason FileMaker Pro (a flat-file) is the best-selling Mac database; superior facilities for dealing with relational complexity similarly account for the popularity of 4th Dimension. nuBase attempts to bridge these worlds by offering a relational database that gives you lots of assistance in first formulating flat-file tables and then establishing relational links.

You define tables from a simple set of prompts, and the results appear in a structure window. The fields of a table (actually a file) can be any of seven types: graphics, buttons, check boxes, and pop-ups for data entry, as well as the usual date, text, and numbers. At this level nuBase is much like FileMaker, featuring a palette of icons for file management, and simple commands for arranging views of files. nuBase is especially forgiving if you change your mind about redefining fields in your file structure, and it gives you a summary of memory requirements for each file definition. You can have 255 fields per record and 32,000 bytes per field. In flat-file benchmark tests (sort, search) nuBase is consistently slower than 4th Dimension (thus much slower than FoxBase+/Mac), faster than Double Helix, and comparable to FileMaker Pro.

But the power in nuBase is the ease of relating files. To establish a connection, you just drag a field from one file to another. That's it (see "Working on Our Relationship"). The carefully written manual (in a surprisingly practical stand-up binder) steps you through relational basics: how to



Working on Our Relationship You connect files in nuBase simply by dragging a field from one file to the next in the Structure window. Not only is this easy, but it also gives you a clear view of file relationships (represented by arrows).

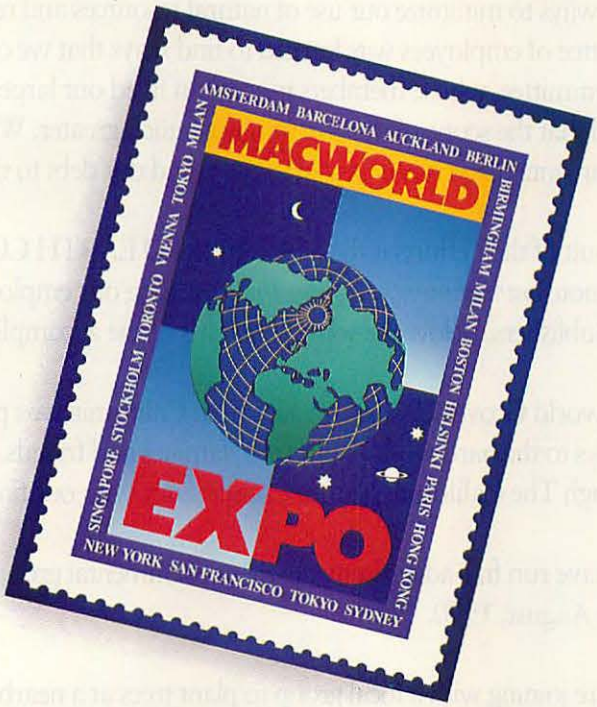
save memory by eliminating duplicate fields in related files, when to choose one-to-one or multiple relations, organizing data for efficient retrieval, and designing informative onscreen views and printed reports. nuBase includes about 50 math and financial functions for calculation in reports, and even explains how and why to use them.

nuBase offers templates that not only show off the product's range of features, but also constitute complete, commercial-quality applications in their own right. The Labels I, Labels II, Client Tracker, Invoice Manager I, and Invoice Manager II templates amount to a complete small-business management system. The templates are self-explanatory and can be customized with minimal effort.

nuBase is not going to lure many in today's developer community away from 4th Dimension, FoxBase+/Mac, or Double Helix, although the dBase Mac community (about 60,000 users) will be happy with New Era's work, as will users who need to convert files from DOS dBase II through IV. The Pascal-style procedural language added in nuBase to the original dBase system is workable if not dazzling (it supports CALLs to other code and XCMDs and XFCNs); real programming power is promised for an upcoming version that uses the impressive, icon-based object-oriented programming system developed at Serius Corporation. For now, if you need a relational database that makes minimal demands on your time, checkbook, or computer-science background, nuBase is an attractive choice.**—Charles Seiter**

See **Where to Buy** *for contact information.*

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MACWORLD EXPOSITION

A Letter to our Readers:

As a magazine publisher, we realize that we use up the Earth's natural resources and contribute to the landfill problem. About a year and a half ago, we decided that we needed to find ways to minimize our use of natural resources and replenish what we use. A committee of employees was formed to find ways that we could repay our "paper debt". This committee, whose members more than filled our largest conference room, soon realized that the scope of the problem was much greater. We realized that the environmental issue is not limited to trees, and our debt to the earth is not limited to paper.

The result of their efforts is the MACWORLD EARTH CONSERVANCY. Its mission is to promote *environmental responsibility* among our employees, readers, advertisers and other publishers. Below are some highlights of the accomplishments of the past year:

- Macworld Grove (25 acres) in Northern California was planted with 3000+ acorns thanks to the hard work of our staff, families and friends. The Grove is maintained through The California Nature Conservancy with our financial support.

MACWORLD



EARTH
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- We have run free advertisements for environmental groups in every issue since August, 1990.

- We are joining with a local group to plant trees at a nearby elementary school. Maintaining the trees will be the responsibility of the students in this special program to teach them about nature and the environment.

- We have a comprehensive recycling program in place at our home office in which our entire 7-story building is involved. We are using paper conservation techniques which have dramatically reduced our use of paper in the office.

- We use post-consumer recycled paper for many of our business and production needs. The Macworld books, published by our sister company, IDG Books, are printed on post-consumer recycled paper.

- We are exploring other uses of recycled/recyclable products for our business and production needs. Some options currently available are prohibitively expensive, but hopefully if demand increases, supplies will also and drive prices down.

Through the MACWORLD EARTH CONSERVANCY, all of Macworld's employees are working very hard to utilize all possible ways of conservation and recycling. This is a monumental task, and we are proud of the progress we've made over the past year and a half. But there is still a long way to go. We will not give up, however, because we are committed to being an organization which is *environmentally responsible.*

If you have any questions, or would like more information about the MACWORLD EARTH CONSERVANCY, please contact Terri Edelman (415.978.3129) or Shelly Ginenthal (415.978.3203) at Macworld's home office in San Francisco.

The Complete Guide to Complete Guides

SORTING THROUGH THOSE BIG PAPERBACK MAC BOOKS

BY DAVID POGUE

What can we make of the fact that the publishing industry thinks we need 50 pounds of 500-page paperback books to get any work done? Unfortunately, it probably signals that the Mac isn't as simple as a toaster anymore.

Almost all the books reviewed here are less than two years old, but only a few cover System 7. Still, books written with humor, knowledge, and an understanding of the way we nontechies think are worth grabbing immediately.

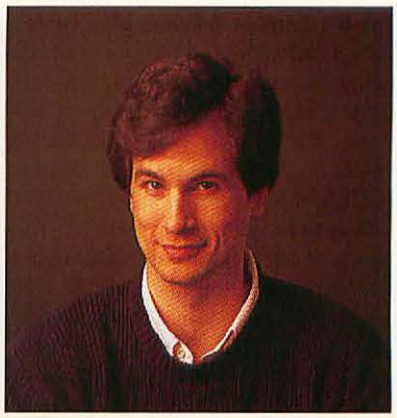
The Macintosh Bible, Third Edition
The granddaddy of them all, and still the best (Goldstein & Blair, 1991; $28). It's an 1100-page collection of juicy blurbs and factoids, in recognition of the fact that trying to impose an A-to-Z structure on something as complex as computing is futile. Margin icons help distinguish first-timers' tips from power-user secrets. The writing shows a healthy, *Consumer Reports*–y mentality when it comes to Mac products, which are wittily critiqued and defended.

Sharon Zardetto Aker (author) and Arthur Naiman (editor) often disagree, sometimes rabidly. In those situations they bicker, alternating paragraphs, giving you terrific insight into the passion of the true Mac nut, and a much more balanced perspective on key issues (eight pages on QuarkXPress versus Aldus PageMaker, for instance). And Naiman's sense of humor is a killer. Is there a flaw in this book? Sure: the font is goofy-looking. (Then again, it's the only book whose price doesn't take us for dummies by ending in .95.)

Unique inclusions: printouts of sample fonts and clip art; awesome tips (especially on Word 4.0); free quarterly updates mailed to you, for the life of the edition, to help avoid Mac Book Obsolescence. Brilliant.

Encyclopedia Macintosh
This 780-pager (Sybex, 1990; $27.95), by Craig Danuloff and Deke McClelland, can't quite make up its mind what it wants to be. It has tons of concise, pointed product reviews, but they're largely out of date and weirdly selected—StuffIt is covered but not DiskDoubler, Pyro but not After Dark, CompuServe but not America Online—so it's not really a buyer's guide. Mixed in with the reviews are tips, but they're not well organized, so it's not really an encyclopedia.

The writing is drier than the Sahara. Technical terms go undefined throughout, modifier keys are referred to by those weird symbols (like ⌥ and ⇧) instead of their names, and there's not a joke or wisecrack to be found. Except for stunningly authoritative chapters on graphics software and a lot of clever ResEdit programming tips, you can do better.



The First Book of the Mac
Carla and Jay Rose, the authors of this 400-page introduction to the Mac, *really* love their computers (MacMillan Computer Publishing, 1991; $16.95). The style is breezy, jokey, fun-loving . . . sometimes too much so. ("Perhaps [the Bézier curve tool] should be called the brassiere tool. Edits your curves.")

If you can take the burbly, gushing tone, you'll like the overviews of software categories; particularly strong are the sections on the basics of word processing, graphic design, and Impractical Applications (games and screen savers). Except for some amateurish illustrations, this is a good one for the absolute novice.

Macworld Complete Mac Handbook
You'll have to trust me not to give this book by Jim Heid an edge because it's got *Macworld* in the title (IDG Books Worldwide, 1991; $26.95). This 548-pager feels like a collection of

(continues)

magazine articles, each on a different Mac facet, like using macro software, database basics, or buying used Macs; frequent sidebars and striking illustrations add to that effect (no ads, though). Read Jim Heid's *Getting Started* column to get a feel for the lucid, friendly writing style.

The book's best feature is the breadth of its coverage. You'll find chapters on topics barely mentioned in other Mac books: surge suppression, music, desktop video, and System 7, for starters. (By the way, I'm a contributor to another *Macworld* book, the *Read Me First* book. It'd be just too weird for me to review it.)

The Big Book of Amazing Mac Facts

Those *Macworld* authors are everywhere, aren't they? This book (Microsoft Press, 1991; $24.95) is something of a "best-of" collection, culled from Lon Poole's *Quick Tips* column. It's not for beginners, but it's the power-user wannabe's heaven: 513 pages of tricks and secrets, both for general computing and specific software, with gorgeous line drawings. There are great hardware hacks (like fixing your mouse), productivity pointers (keyboard window-cycling in Word), and handy hints (making neon type in Illustrator). These scattershot tips are as juicy as the ones in *The Macintosh Bible;* not as opinionated, perhaps, but in a nicer typeface.

Dr. Macintosh

This 341-page Bob LeVitus book is worth mentioning, although the current (1989) edition is too old to buy now (Addison-Wesley; $19.95). It's a first-person, opinionated view of the Mac universe, chock-full of Mac myths, do's and don'ts, and specific buying suggestions. The troubleshooting hints, as well as the segments on justifying major hardware purchases, are especially good. The product recommendations, however, are far out of date. Watch for the new edition in early 1992.

Apple Macintosh Book, Third Edition

Last updated in 1988, this book too has a new edition on the way (Microsoft Press; $21.95; by Cary Lu). It remains mostly relevant, since it avoids mentioning specific products. These 400 pages are essentially a technical primer. It explains how everything works: how a monitor displays images, how a laser printer gets the image onto paper, what the differences are between programming languages (like Basic and C), and so on. It also explains where things got their names: serial port, supertwist, SIMMs.

The book also covers topics not found anywhere else: use of the Mac by the disabled, printing to film, how to read the secret messages on the LaserWriter start-up page. Lu also has a chapter called Future Directions; it's uncanny how many of his predictions come true. (In the 1988 edition he predicts "live links" in software [that is, publish and subscribe], that every Mac will have a hard drive, and that nothing will replace the mouse.) Fascinating going.

Inside the Apple Macintosh

Here's another how-it-works book, this one with a lively, conversational tone (Brady Books, 1989; $24.95; by Jim Heid and Peter Norton). Even marginal wireheads will find these 600 pages gripping; clever analogies, unusual photos, and outstanding graphics make all kinds of techy topics amazingly clear. In other words, this isn't the book for the newcomer, especially since there's virtually nothing about software; but nor is it as high-end as the title makes it seem.

Bits of the best: a prehistory of the Mac; a history of Mac system software; articulate discussions of fonts, PostScript, and monitors; using ResEdit to improve software; and the best chapter on networking you can find in a general Mac book.

Macintosh Companion

This 591-page book (Addison-Wesley, 1991; $22.95) by Sharon Zardetto Aker makes a peculiar assumption: that *everyone* uses System 7. It's written lucidly, but with little humor and much caution. "A *file recovery program* helps you recover files from a damaged disk," it says—but the heck if it's going to tell you that program's name, or where to get it. The book rarely deviates from authorized Apple terminology and methodology.

It is geared for the beginner, has clever illustrations, and is primarily concerned with the Finder, desk accessories, and basic Mac techniques. Berke Breathed (creator of the comic strip "Bloom County") drew the hilarious chapter frontispieces.

The Big Mac Book

The 900-page *Big Mac Book* contains a wealth of information (Que, 1991; $29.95; by Neil J. Salkind)—coverage of everything from System 7 (a preview) to printer mufflers.

Most of it is a bunch of pseudo-reviews, from WorksPlus Spell to the "LaserWriter SilentWriter printer" (?). All are favorable. (And all cry out for an editor: "As your and my mothers said," begins one sentence.) Complete with factual errors, missing graphics, and typos. You might say this is a rather buggy book.

The Little Mac Book, Second Edition

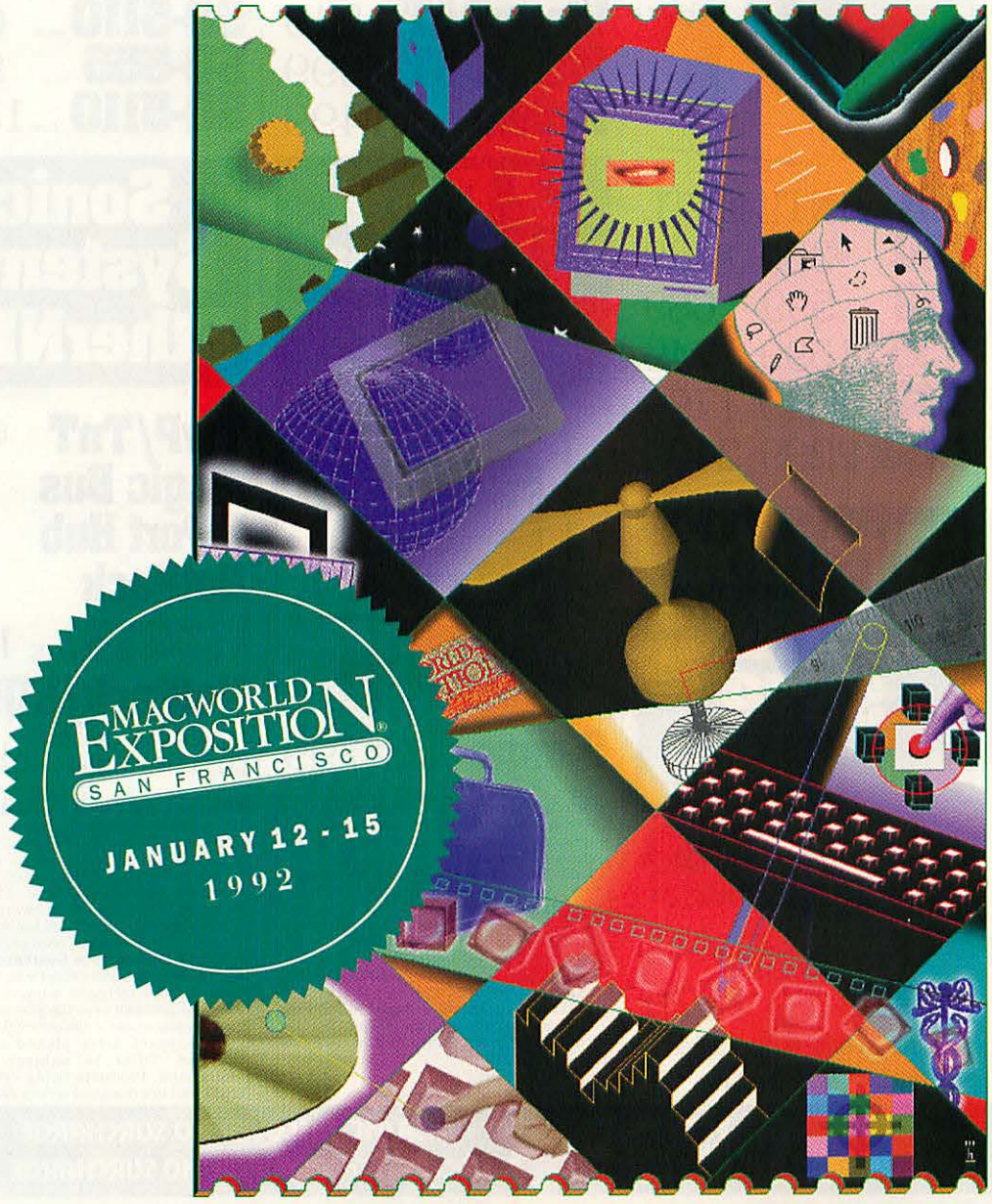
For the brand-new Mac owner, here's an interesting alternative (Peachpit Press, 1991; $14.95; by Robin Williams and Kay Nelson). (Don't mistake the author Robin Williams for the comedian—nor her book for the confusingly titled *Little Mac Book* by Neil Salkind.) This 180-pager was written by a woman who evidently struggled through the official Apple gospel, finally made some sense out of it, and wants to teach it to fellow computerphobes in her own unorthodox terms.

Topics include the Finder, desk accessories, and System 7. Everything is simply explained. The approach emphasizes terminology, some of which is nonstandard (*press-and-drag* instead of just drag). And not all of the info is accurate; for instance, you're told that after you choose Empty Trash "No amount of crying or pleading . . . will bring [a trashed file] back. Believe me." No, don't; crying won't help, but a file-recovery program like Norton Utilities will.

At its best, Williams's flustered-by-technology approach strikes a chord; the troubleshooting chapter is called "Aaack!! Help!" Now *there's* some real Macintosh terminology you won't find in the manual. ■

Contributing editor David Pogue is a manual writer, Mac consultant, and magic instructor.

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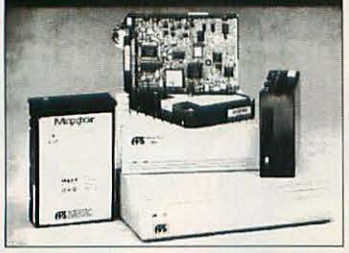
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Circle 15 on reader service card

NEW PRODUCTS

Edited by Evan Cooper

This section covers Macintosh products formally announced but not yet evaluated by Macworld. All prices are suggested retail. Please call vendors for information on availability.

HARDWARE

BulletModem E2400M

External modem operates at full-duplex 2400 bps in synchronous mode with V.22 bis, and at 9600 bps in asynchronous mode with V.42 bis. Two-year warranty. $295. E-Tech Research, 408/730-1388.

DAT Stacker

Digital audiotape drive with loading mechanism that holds eight 4mm DATs for up to 16GB of storage. Ships with Retrospect Remote from Dantz Development for unattended backup. One-year warranty. $8995. PLI, 510/657-2211, 800/288-8754.

Futura Cards

Family of NuBus boards with graphics acceleration and 24-bit color. Company claims boards speed graphics operations by up to 500 percent. Support variety of monitor sizes and have virtual screen, pan, zoom, and video-out capabilities. Virtual screens produce documents up to 28 by 28 inches that can be panned in real time. Support up to 24-bit color; output RGB, NTSC, and PAL video signals. One-year warranty. Futura EX $795; Futura SX/8 $995; Futura SX $1495; Futura MX $1995. E-Machines, 503/649-6699.

LS-3510AF

35mm automatic-focus film scanner for color or monochrome positives and negatives. 12-bit option enables scanner to read 4096 gradations of red, green, and blue. Slide mount provides 360-degree rotation before scanning. Bundled with Photoshop or ColorStudio software. $8995. Nikon, 516/547-4200.



LS-3510AF

LX-29000

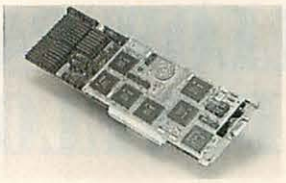
4-pages-per-minute, 300-dots-per-inch PostScript laser printer that also works with IBM PCs and compatibles. Includes 35 resident typefaces, 2MB of RAM, and 16MHz AMD 29000 RISC processor. One-year warranty. $1295. The Printer Works, 510/887-6116.

Magic Wand Keyboard

Miniature keyboard designed for people with little or no mobility in hand or arm. Features penlike wand pointing device for registering key clicks. Keyboard has standard layout and includes dedicated mouse keys and user-definable keys. $1425. In Touch Systems, 914/354-7431.

MCC-1000 SMDSTalk

NuBus board provides virtual LAN connection for Mac II's across wide area network via Switched Multimegabit Data Service (SMDS), a high-speed public overlay data network. Board runs at 1.544Mbits per second. Requires AppleTalk version 56 or later. $2999. Multiaccess Computing Corporation, 805/964-2332.



MCC-1000 SMDSTalk

MediaTime

Fully integrated NuBus adapter that combines CD-quality digital audio with 24-bit real-time video and graphics display. Uses a dedicated digital signal processor; records sound directly to hard drive and plays back at 16-bit fidelity. Supports monitors up to 37 inches; provides interlaced output in NTSC and PAL formats. $2799. RasterOps, 408/562-4200, 800/468-7600.

MicroTrac

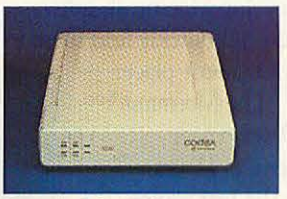
2⅘-by-2-inch trackball has 400-dpi resolution and clips for mounting it on side of keyboard. Has three buttons spaced around the ball, and an LED indicator for drag-lock button. Bundled Control Panel software allows user to customize buttons. $89.95. MicroSpeed, 510/490-1403.



MicroTrac

Motorola Codex 3220

Modem that supports transfer rates from 300 bps to 9.6 Kbps with V.32 industry-standard protocol. Operates in synchronous and asynchronous modes. $795. Motorola Codex, 508/261-4000.



Motorola Codex 3220

N9001

3½-inch, 900MB internal hard drive based on Toshiba mechanism. Hard drive features 12.5ms access time, 10MB-per-second data-transfer rate, and 512K cache memory. Ships with The Norton Utilities for the Macintosh and Visionary

(continues)

Software's LifeGuard. Includes five-year limited warranty. $4599. Microtech International, 203/468-6223, 800/626-4276.



N9001

PageBrush/Color

Hand-held, single-pass, 400-dots-per-inch color scanner bundled with VideoPaint from Olduvai. Scans at 100 dpi to 400 dpi; uses external SCSI interface box. $895. Mouse Systems, 510/656-1117.

Pro-III

PostScript-compatible laser printer that combines proprietary raster image processor with high-resolution plain-paper laser imager. Images up to 256 levels of gray at 1200 dpi. Comes with 12MB of RAM, 40MB hard drive, 35 resident fonts, and 250-sheet paper cassette. Printing speed is 12 ppm for letter size and 6 ppm for ledger pages. Maximum printing area is 11 by 17 inches. $17,990. Printware, 612/456-1400, 800/456-1616.



Pro-III

Ringo LM

Automatic switching unit for faxes, modems, phones, and answering machines. Includes software that can shut down Mac automatically and launch applications at start-up. Supports single or multiple lines; routes incoming calls to appropriate device; wakes up Mac II when call is directed to fax or modem. $189.95. MacSema, 503/757-1520, 800/344-7228.

SA14400

External V.32 bis modem runs at up to 14,400 bps. Front control panel features 32-character alphanumeric LCD readout to monitor modem operations. Users can download system upgrades from vendor to increase transfer rate. $1245. Forval America, 714/347-0100.



SA14400

Scan-X Color

24-bit color desktop scanner with 2400-dpi resolution for line art, 600 dpi for color and gray-scale images. Ships with Adobe Photoshop and Scan-X plug-in software module. $2795. HSD Microcomputer U.S., 415/964-1400.



Scan-X Color

SCSI JackHammer

RISC-based SCSI-2 coprocessor for Mac NuBus port that produces sustained

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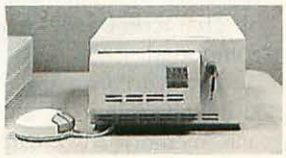
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transfer rates of up to 20MB per second. Port is 12 times faster than SCSI port on Mac IIfx, according to company. Supports SCSI-2 fast, and 16-bit-wide, synchronous transfers. Compatible with all Macs with NuBus slots. $999. FWB, 415/474-8055.

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Family of four, 5¼-inch SCSI Winchester disk subsystems with capacities from 380MB to 2GB in removable disk canisters for data security, archiving, or portability. Subsystems available in tabletop, chassis-, or rack-mount configuration. 380MB $2640; 760MB $3270; 1.2GB $3980; 2GB $6810. Unbound, 714/843-1895.



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Thumbelina

Miniature trackball measuring 1½ inches square and ¾ inch high. Device can mount on Mac keyboard and has mouse button, illuminated drag-lock button, and button that changes cursor speed. $99. Appoint, 805/239-8976, 800/448-1184.



Thumbelina

Video Explorer

Real-time digital processing board that creates traditional video production effects on a Macintosh. Effects include transitions, overlaying of antialiased text and graphics onto live video, and advanced image processing. Board supports RGB input and output and can be expanded to include support for other formats. $8000. Intelligent Resources, 708/705-9388.

ViewSonic 8

A 20-inch noninterlaced monitor that company says complies with Swedish guidelines for extremely-low-frequency emissions. 1280-by-1024-dpi monitor has a microprocessor-based memory and digital control system with 16 preset modes that can be reprogrammed by user. One-year warranty. $2999. ViewSonic, 213/946-0711, 800/888-8583.



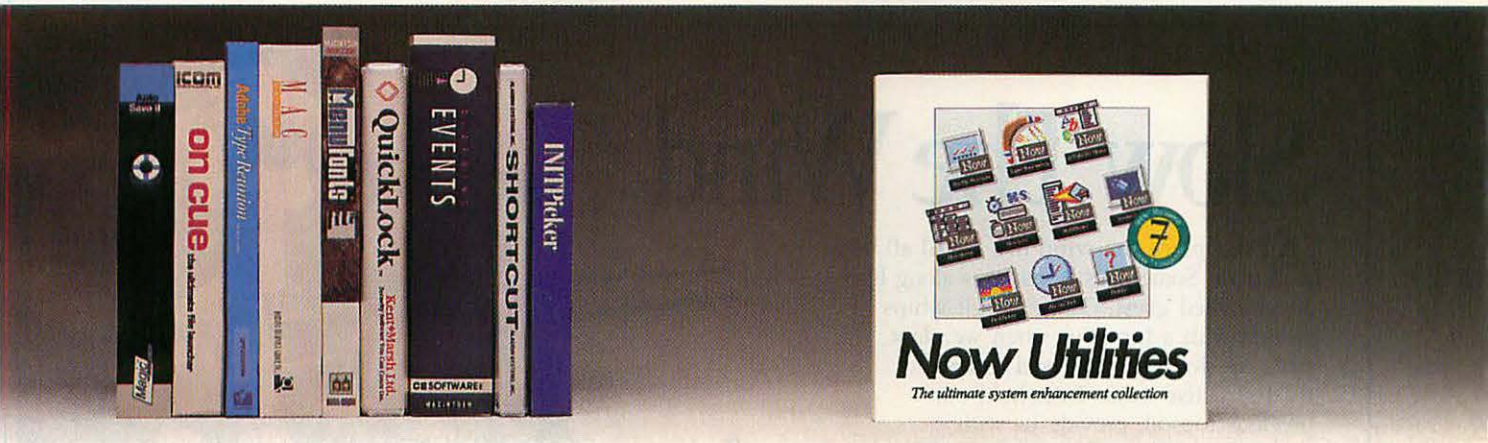
ViewSonic 8

SOFTWARE

Aldus Gallery Effects, Volume 1: Classic Art

Collection of filters for creating special artistic effects in popular graphics programs that support plug-in filters, such as Adobe Photoshop, Aldus SuperPaint, and other packages. Filters include dry-brush, fresco, mosaic, and watercolor. 2MB min. memory. $199. Aldus Corporation, 619/695-6956.

(continues)



THAT WAS THEN. THIS IS NOW.

Over the years, a lot of great utilities have been created to make the Macintosh even easier and more useful.

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For example, Super Boomerang finds files by name or content, even if they've been compressed. NowMenus creates submenus up to 5 levels deep for anything you put in the Apple Menu folder — even other folders. StartUp Manager eliminates most System crashes by expanding the System Heap and disabling incompatible INIT combinations. And WYSIWYG Menus helps you quickly find the fonts you want by grouping font families into submenus, displaying fonts in their own typeface, and letting you change the order fonts appear in menus.

In fact, everything in the collection is the leader in its category. Just as importantly, everything in the collection is guaranteed to work together, and with anything else you may have...even System 6.

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Audio Trax

Software that combines 2-track digital-audio recorder with 64-track MIDI sequencer. Supplements MIDI-based music with synchronized digital audio. Can record two tracks of digital-audio sound directly to hard drive. Sequenced and audio data can be edited on screen using cut, copy, and paste commands. Supports Apple's MIDI Manager. 2MB min. memory. $299. Passport Designs, 415/726-0280.

CurrenTides

Predicts tides and currents for select locations and displays information in graphical form. Uses harmonic method of prediction to show data for one or several days. Software can be used with Fair Tide's Navigate package. 1MB min. memory. $150. Fair Tide Technologies, 617/229-6409, 800/732-3284.

The Facilitator

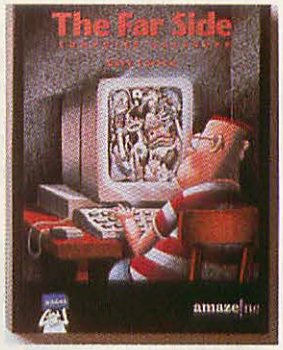
Meeting-management system that plans agendas, supports note-taking, evaluates meetings' effectiveness, and produces minutes. Also provides variety of classical problem-solving models. 1MB min. memory. $350. DiscTech, 716/872-4693.



The Facilitator

The Far Side Computer Calendar

Personal appointment calendar that displays a different "Far Side" cartoon for each day of 1992. Program allows user to display and edit appointments by day, week, month, or year. Includes module that randomly displays brief segments of animation. 512K min. memory. $69.95. Amaze, 206/820-7007.



The Far Side Computer Calendar

GlobalTalk

Application for creating terminal programs, custom front ends, bulletin board systems, and other telecommunications applications from within HyperCard, SuperCard, and compatible environments. Users can make their own applications or modify included sample front end. 1MB min. memory. $295. Hyperpress Publishing Corporation, 415/345-4620, 800/633-4252.

KanjiSama

Reference tool for students of the Japanese language. Allows users to access 2965 kanji characters and their meanings. Program contains general and technical Japanese-English dictionaries and offers five look-up modes for identifying characters. Looks up compound characters using any character or combination of characters from the compound. Creates flash cards for drilling. Apple's KanjiTalk required. 2MB min. memory. $149. Sanbi Software, 714/352-0276.

Slow The Wind

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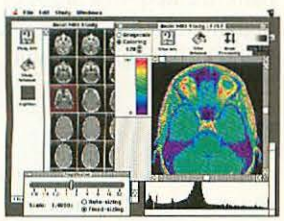
The National Arbor Day Foundation

LaserCheck

Allows PostScript laser printer to output files intended for printing on an imagesetter. Software intercepts low-level PostScript commands and shrinks any page size specified for an imagesetter to fit on laser-printer page. Prints crop marks, registration marks, and file data. 512K min. memory. $149. Systems of Merritt, 205/660-1240.

MedVision

Modular visualization software that allows medical researchers to analyze and enhance medical images.



MedVision

Standard package contains 19 modules and 4 file filters. Can convert data from General Electric, Picker International, and Imatron systems. 2MB min. memory. $895. Evergreen Technologies, 301/948-1800.

PowerTrax

Contact-management and time-management system that includes scheduling, word processing, address-book, and project-management features. Generates variety of custom or preformatted reports on activities. System keeps detailed records on contacts and leads. 1MB min. memory. $495. Soft Solutions, 404/457-9400.

PS2000 RIP

PostScript software interpreter that produces rasterized data from PostScript files to be output on a Monotype image recorder. Color or monochrome files can be queued to disk; advanced preview function shows job on screen prior to output on image recorder. Package includes 43 PostScript Type 1 fonts, and LaserBus Interface board. Requires Mac IIcx or higher. 8MB min. memory. $14,500. Monotype, 708/350-5600.

QuickTools

Collection of eight Macintosh utilities. Includes 24-bit-color screen-capture cdev; Power Strip, a floating menu for launching documents and applications; automatic save utility; and Dialog Power, a utility that enables user to assign keyboard equivalents to dialog-box options. 1MB min. memory. $79.95. Advanced Software, 408/733-0745, 800/346-5392.

SafeDeposit

Automatic full-time backup utility for AppleShare servers. Allows network administrator to specify (by owner or group name) which files will be backed up. Network users can access server while backup is in progress. 1MB min. memory. One-server kit $595; ten-server pack $4500. TerraNetics, 818/446-7692.

Showplace

3-D picture-composition package for creating photo-realistic images. Scenes are composed using 3-D clip art included with Showplace; also supports art imported from other libraries, and objects from any modeling application that outputs RenderMan Interface Bytestream (RIB) files. Pictures are rendered in MacRenderMan (included

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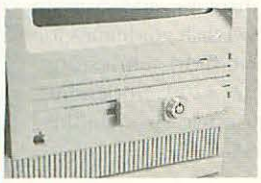
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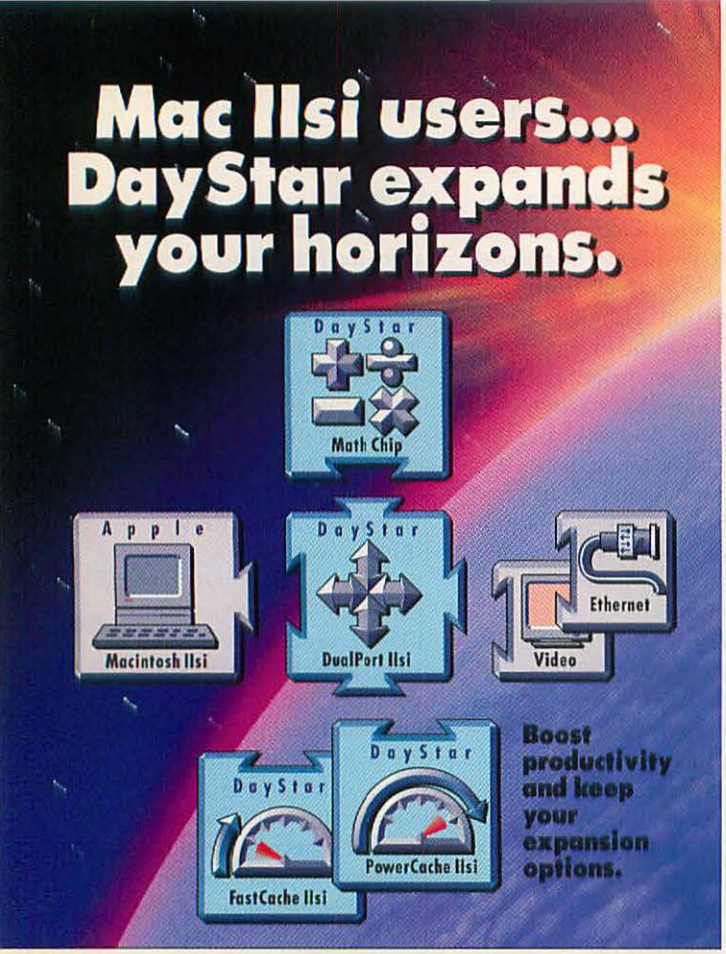
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Tableworks

QuarkXTension table editor add-on for QuarkXPress 3.0. Integrates directly into program; all style and formatting abilities are available during table development. Globally adjusts all rows and columns to fit text; autosizes table continuously as text is typed. Creates multipage tables with column-header duplication. 4MB min. memory. $299. Npath, 914/657-2748, 800/826-7284.

TerraView

Function library that allows programmers to create custom-mapping applications in C, Pascal, or compatible language. Supports wide variety of data types; interfaces maintain Mac look-and-feel; and complex functions accessed through simple subroutine calls. 1MB min. memory. $3495. TerraLogics, 603/889-1800.

Virtus Vision

Modeling, visualization, and simulation program for conceptualizing and presenting information three-dimensionally. Real-time environment allows on-screen interaction with 3-D objects. 2MB min. memory. $695. Virtus Corporation, 919/467-9700.

Wallpaper

Allows user to display, create, edit, and save large desktop patterns using up to 256 colors, or in gray-scale or black and white. Supports patterns up to 64 by 64 pixels under System 6.0.X and up to 128 by 128 pixels under System 7. Includes more than 400 patterns; has specialized drawing tools for creating patterns. Requires SE/30 or higher. 1MB min. memory. $59.99. Thought I Could, 212/673-9724.

Zap Fax

Allows network users to share single fax modem. Runs in background on client and server machines. Supports fax queueing, distribution lists, and transmission notification. 1MB min. memory. 5 users $199; 10 users $299; 20 users $399; 50 users $499; unlimited users $795. Sunrise Services, 408/377-4661.

ACCESSORIES

Ergo Shields

Line of filters for Radius monitors designed to reduce electric-field emissions, glare, and static buildup. Filters are available for entire line of Radius displays, and comply with Swedish guidelines for electric-field emissions. $150 to $299, depending on monitor size. Radius, 408/434-4040.

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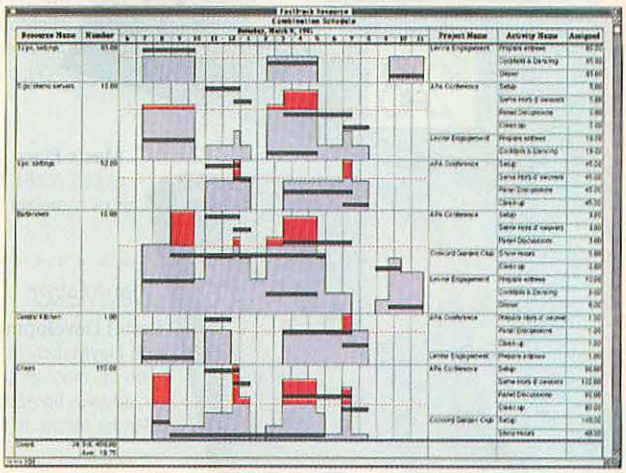
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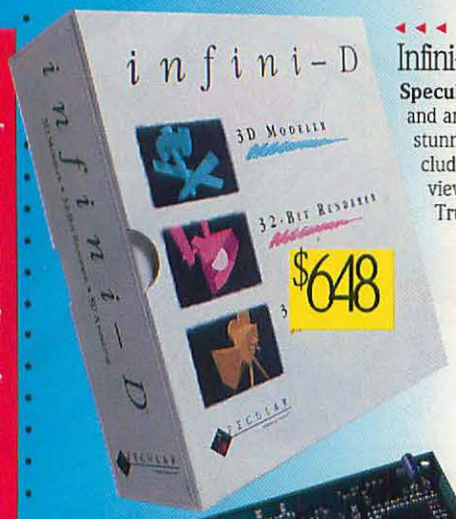
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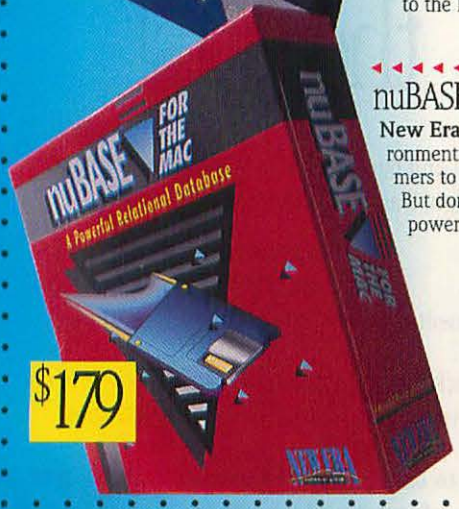
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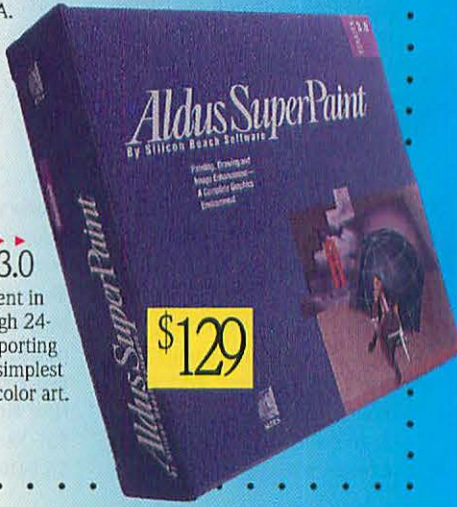
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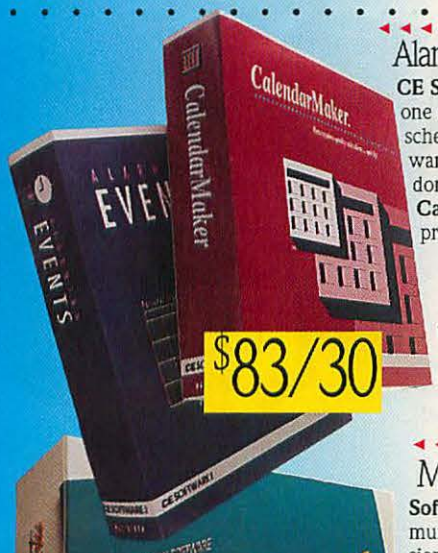
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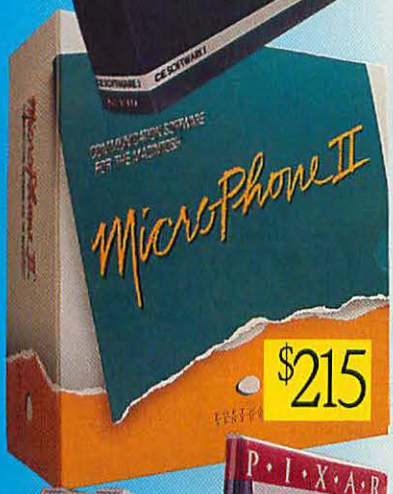
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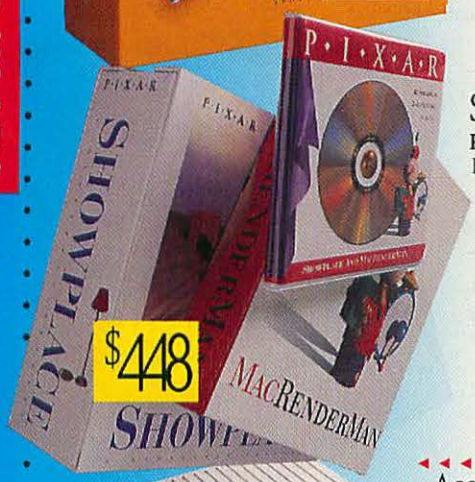
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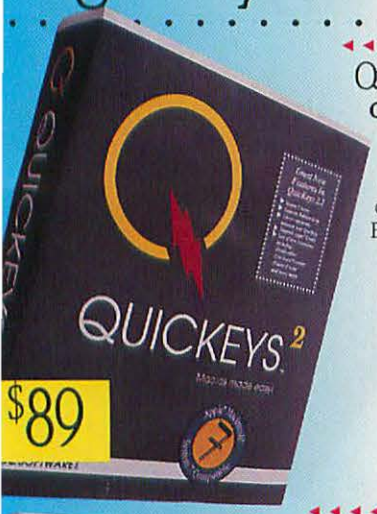
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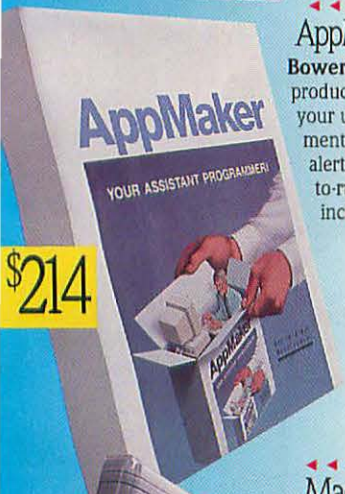
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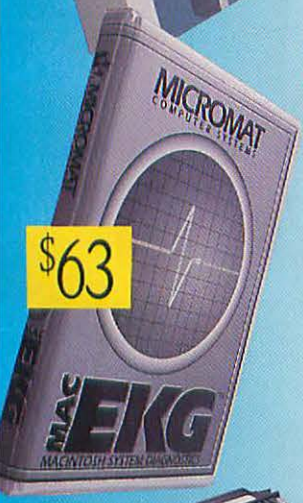
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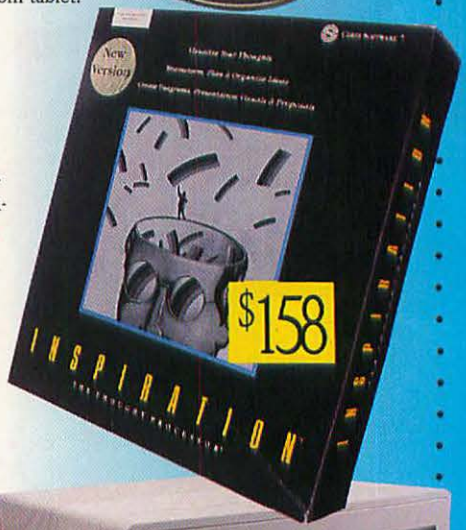
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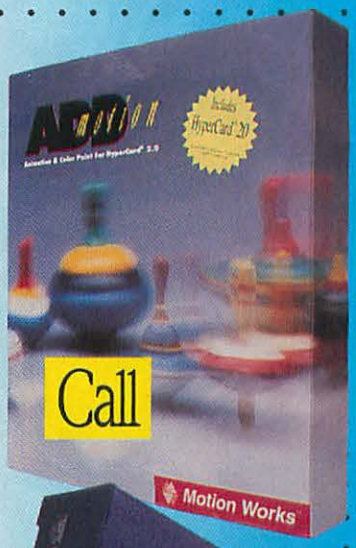
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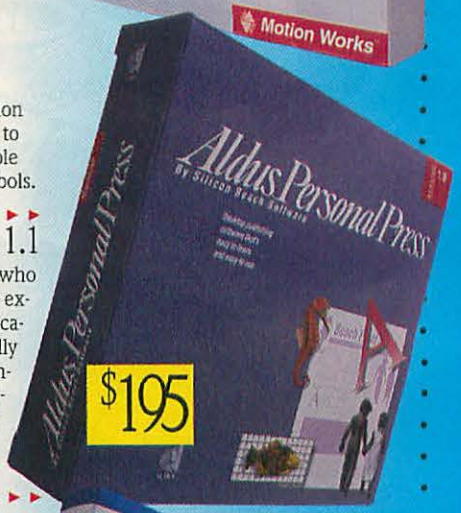
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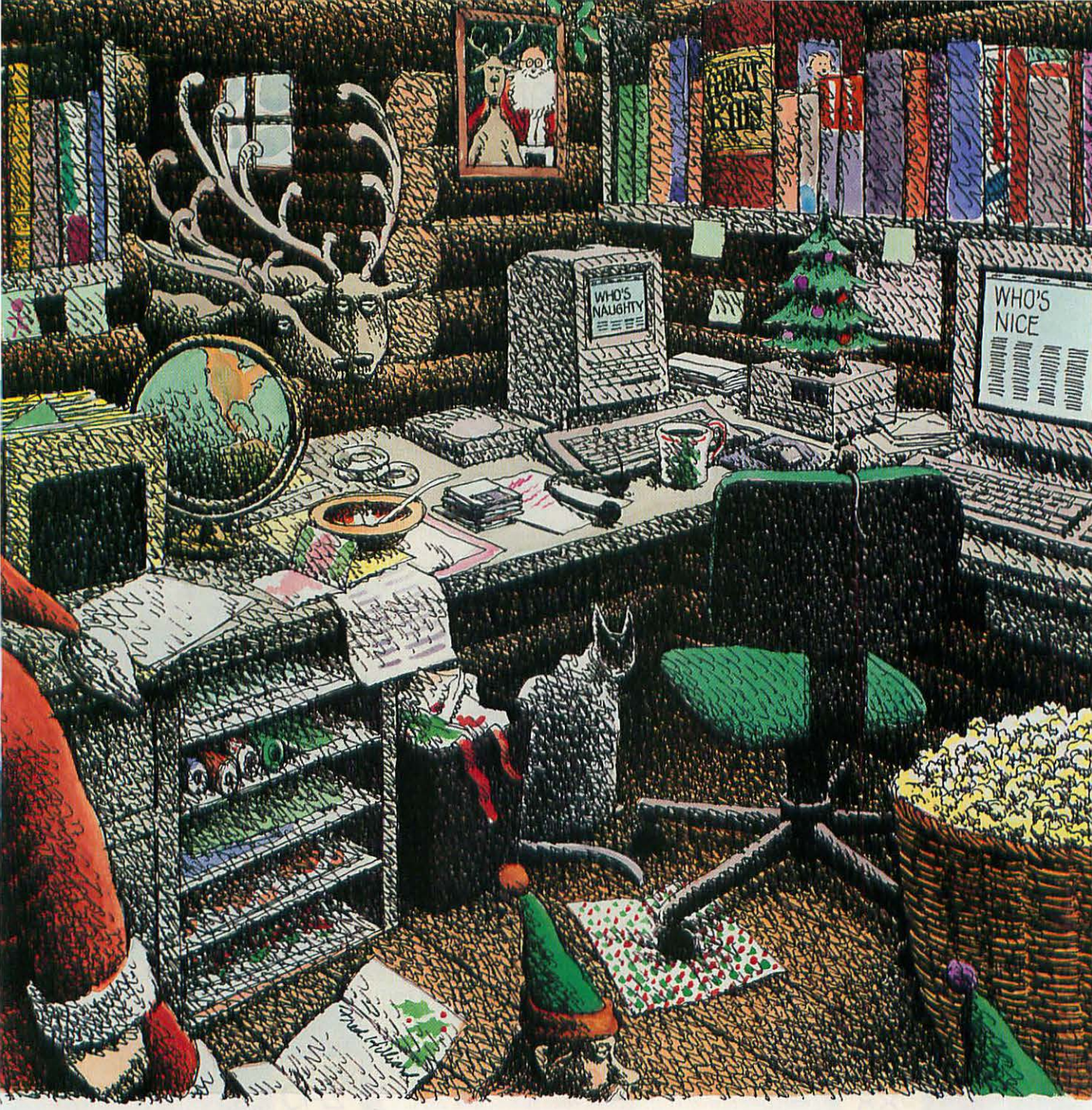
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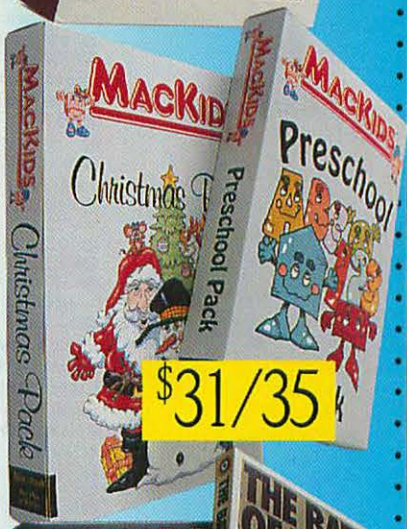
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$38

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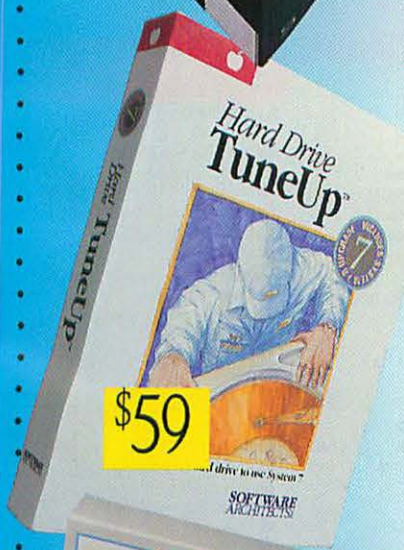
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Quick Tips

SIMM INCOMPATIBILITIES, BYPASSING THE INTERNAL HARD DRIVE, RESCUING DAMAGED HYPERCARD STACKS, AND MORE

BY LON POOLE

Many floppy disk drives that are returned to Apple for repair simply need cleaning. If your Mac has trouble reading or writing floppy disks, clean the floppy disk drive regularly with a 3M Diskette Head Cleaning Kit, says an Apple Service Note sent to dealers. In specifying the 3M product, the Service Note states, "Do not clean these drives in any other manner, since other methods may damage them. We recognize that there may be other kits available that clean floppy drives without damaging them, but the 3M kit is the only one currently approved for use with Apple products." 3M recommends cleaning weekly or after 40 hours of use (more often in a dirty environment), and claims this frequency will prolong disk life. A 10-cycle kit lists for $9.95, a 13-cycle kit for $19.95.

More Background Printing

StyleWriter owners have another option for background printing besides the SuperSpool software mentioned in a tip last September. Apple's software for the StyleWriter and Personal LaserWriter LS printers now has background printing capability and also includes four more TrueType fonts than the previous version—Chicago, Geneva, Monaco, and New York. To get a software upgrade, ask your Apple dealer or Macintosh user group for version 1.1 or later of the StyleWriter Installation Disk Set or the Personal LaserWriter LS Installation Disk Set. You should get three disks: an installer disk, a fonts disk, and a printing tools disk. The software is free, though you may have to pay for disks and handling.

SIMM Incompatibilities

Two other Apple Service Notes describe SIMMs that are incompatible with certain Macintosh models. Some new 1MB SIMMs have only two memory chips instead of the more common eight memory chips. Installing the two-chip 1MB SIMMs in a Mac Plus, SE, Classic, II, or IIx may cause start-up problems or system freezes. If you buy new SIMMs for one of those models or scavenge SIMMs from another model, make sure the SIMMs you install are compatible. The two-chip SIMMs work fine in the SE/30, IIci, IIsi, and LC and may be installed in those models at the factory.

Apple has also discovered that some third-party 2MB SIMMs cause the Mac LC and IIsi to freeze or crash. To test suspect SIMMs, remove them and substitute known good 1MB SIMMs. Before buying 2MB SIMMs, make sure the manufacturer certifies them compatible with the LC and IIsi.

Learning to Program the Mac

Q I am a recently inspired programmer who writes in QuickBASIC. I've read accounts of the "famous" sieve of Eratosthenes. Can you explain what it is, and show a listing for it?

Second, I would like to move on to other, more capable languages such as C or Pascal as I become more proficient at programming. Would one language be useful as a stepping stone



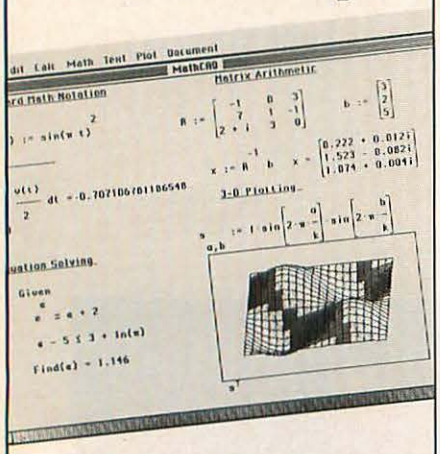
to the other, or are they so different that they require separate training? Could you recommend a beginner's program for either language? I was thinking about Just Enough Pascal by Symantec.

Alex Geddie
Fonthill, Ontario, Canada

A The Sieve of Eratosthenes is sometimes used to compare the relative performance of different Mac models. You compile the program and clock its execution time on each Mac (see "Sieve"). To make timing easier, you may want to add a FOR/NEXT loop that repeats all the statements from **primeCount = 1** to **NEXT index** ten times. You should start with Pascal because you need some familiarity with it to read Apple's technical documentation. The concepts and principles you learn about writing Macintosh software will transfer to C or another language if you decide to switch later. If you start with C, you'll also need to learn to read Pascal. (Of course, learning to read a second language is much easier than learning to "speak" it.)

(continues)

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MCTECH 2.0

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Just Enough Pascal is an interactive tutorial book and disk that teaches Pascal fundamentals. Think Pascal and Think C both have everything you need to develop software for the Mac on a Mac. They don't have all the bells and whistles of Apple's Macintosh Programmer's Workshop (MPW), but the Think products cost half as much and are easier to learn.

Learning Pascal or C is the easy part. The hard part is learning how to write software for the Mac in any programming language. If you have someone else's money to spend, get the $595 interactive training course Macintosh Programming Fundamentals by Apple Computer's Developer University. It teaches you how to build Macintosh applications in Think C. You also need 10MB of hard drive space and a CD ROM drive.

You can also learn Macintosh fundamentals from books. If you have some programming experience, start with *Macintosh C Programming Primer, Volume I* (Addison-Wesley, 1989) or *Macintosh Pascal Programming Primer* (Addison-Wesley, 1990), both by Dave Mark and Cartwright Reed. The same authors cover more-advanced topics in *Macintosh C Programming Primer, Volume II* (Addison-Wesley, 1990).

For reference, you'll need a copy of *Inside Macintosh, Volumes I–VI* (Addison-Wesley, 1991), by Apple Computer. If you can't afford all six volumes at once, start with volumes I, V, and VI. Apple publishes additional technical information bimonthly in its *Macintosh Technical Notes* series. You can freely copy the notes from a user group, an online information service, or anyone else who has them. You can also subscribe to the notes through APDA, the Apple Programmer's and Developer's Association (U.S., 800/282-2732; Canada, 800/637-0029; elsewhere, 408/562-3910).

Listing of "Eratosthenes Sieve"

```
'-- Eratosthenes Sieve for Finding Prime Numbers
DEFINT A-Z
DIM STATIC primes(8191)
sieveSize = 8191
true = 1
false = 0

primeCount = 1   'prime counter
'--initially assume all numbers are prime
FOR index = 2 TO sieveSize
  primes(index) = true
NEXT index
'--look for next prime
FOR index = 2 TO sieveSize
  IF(primes(index)) THEN
    '--found a prime; multiples of a prime
    '--are NOT prime, so make them all false
    notPrime = index + index
    WHILE notPrime <= sieveSize
      primes(notPrime) = false
      notPrime = notPrime + index
    WEND
    primeCount = primeCount + 1
  END IF
NEXT index
PRINT primeCount; "primes found."
END
```

SIEVE **Using the Sieve of Eratosthenes method, this QuickBASIC program finds all prime numbers between 1 and 8191 by progressively eliminating all multiples of primes greater than 1. First it eliminates all multiples of 2, then of 3, then of 5, and so on.**

Bypass Internal Hard Drive

Q Some months ago an acquaintance demonstrated how to start up a Macintosh SE without mounting the internal hard drive. When I later tried to reproduce the procedure on my Mac, I couldn't remember the combination of keys to press.

Jol A. Silversmith
Rockville, Maryland

A Press delete, option, command (⌘), and shift (to remember, think "DOCS"). This trick should work on the SE and newer models.

HyperCard Corruption

Q Can I salvage a corrupted HyperCard stack? When I page through the stack and happen upon a damaged card, I get a dialog box with the message "Unable to read card or background id 125451." Clicking the dialog box's OK button quits HyperCard.

Greg Lambertson
Arlington, Virginia

A You can probably copy and paste the undamaged cards to a new

(continues)



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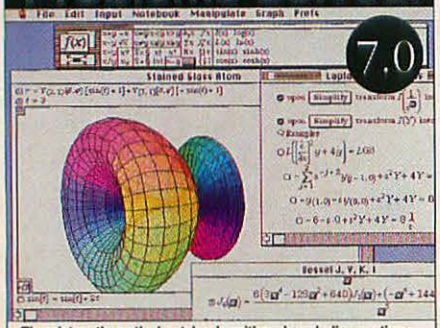
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– *Five mice review,* MacUser *magazine, June 1990.* 🐭🐭🐭🐭🐭

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Circle 179 on reader service card.

stack (created with the New Stack command in the File menu) one card at a time. This method works with most damaged stacks, but not, for example, with stacks you can't open at all. You make a new stack with the New Stack command and work your way through the stack, copying a card from the old stack and pasting it at the end of the new stack. When you come to the card before a damaged one, you can skip over the damaged card by typing the following command in the message box:

go card the number of this card + 2

Then resume copying and pasting undamaged cards. You can automate this procedure with the stack Recover, by Greg Jorgensen of Apple. It's available at low cost from user groups such as BCS Mac (617/625-7080) and from online information services such as America Online (in the Macworld Online forum's Software Library).

Sorting Value Lists

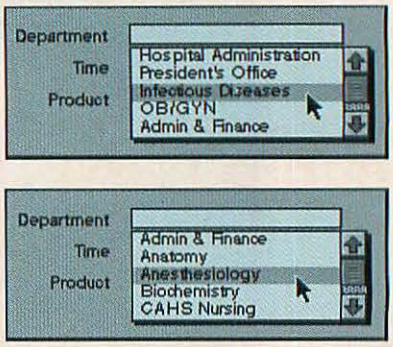
TIP: Claris's FileMaker Pro lets you create a list of values for a field so that when you're entering records you can choose from the list instead of typing in the correct one (see "Disorder and Order"). FileMaker Pro has no built-in feature for sorting (alphabetizing) one of these value lists, but you can quite easily use another program to rearrange a list. First make a backup copy of your database so you can go back to it if something goes wrong. Then follow these steps:

1. Choose Define Fields from FileMaker Pro's Select menu to get the Define Fields dialog box. In that dialog box, select the field whose predefined list of values you want to rearrange, and click the Options button. In the next dialog box, click the Edit Values button. Yet another dialog box appears displaying the list of values. Select the entire list.

2. Press ⌘-C to copy the selected list of values to the Clipboard. Dismiss the FileMaker Pro dialog boxes by clicking OK, OK, and Done.

3. Switch to a program, like Microsoft Word, that can sort a list. If your Mac can't have both programs open at once, you can quit FileMaker Pro and open the other program.

4. Use the Paste command to put a copy of the value list into an empty



DISORDER AND ORDER FileMaker Pro and FileMaker II can't alphabetize a list of values (top), which may also appear as a pop-up menu, several check boxes, or radio buttons. But you can copy the list from FileMaker, rearrange it in another program, and copy it back (bottom).

document. Arrange the list in the order you want. In Word, you can alphabetize the list by selecting it and choosing Sort from the Utilities menu. Select the rearranged list and copy it to the Clipboard.

5. Switch back to FileMaker Pro and repeat step 1 to select the old list in FileMaker Pro. Press ⌘-V to paste the rearranged list over the old list. Dismiss the FileMaker Pro dialog boxes, and you're done.

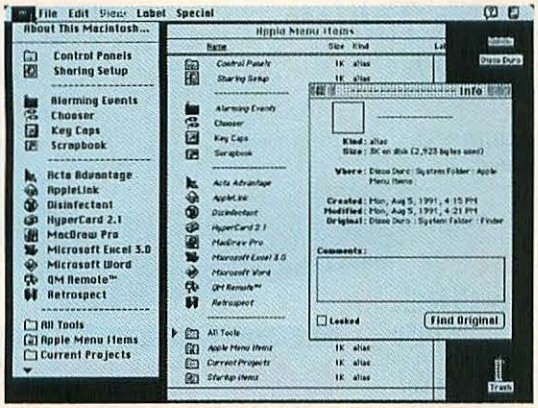
A similar procedure works in FileMaker II, though some command and button names are slightly different and you don't have to click an Edit Values button to see the list of values.

Jerry Rugletic
Philadelphia, Pennsylvania

Vette Tricks

TIP: I have discovered several tricks for the incredible new game Vette from Spectrum HoloByte. The horn makes game play much more fun, yet it's only shown on a keyboard diagram in the manual. Just press the Z key when you feel like honking.

There is a way to drive to the little island off the San Francisco–Oakland Bay Bridge. First drive toward the east end of the Bay Bridge. Just as your car reaches the edge and seems poised to hit the water, the scenery suddenly changes and you find yourself on the island. Check out the streets—they're named after the programmers and some well-known people. To get back onto the Bay Bridge, drive off the end of Fransen Street as if you were heading into the water.



ORDERLY APPLE MENU **Group items in your Apple menu by prefixing similar items with the same number of blank spaces. Add separators between groups by renaming aliases or folders with hyphens, prefixing their names with blank spaces also, and replacing their standard icons with white space.**

Here's how you can experience four-digit speeds in Vette. In manual shift mode, start speeding in any gear above second. Then downshift to first, which will cause the engine to rev crazily. Immediately, hit the brakes for a second or so. Then press A for automatic shift, press 1 for first gear, and step on the gas again. You should be going over 400 miles per hour. If you again go into manual shift mode and repeat the procedure, it is possible to turn the first digit of the speedometer yellow. This means you are driving faster than 999 mph.

Steven A. Lee
Belleair, Florida

Vette author Joel Powers says the island at the east end of the Bay Bridge is Alameda, where Spectrum HoloByte is located.—L.P.

Apple Menu Organization

TIP: The Apple menu is improved in System 7 because you can customize it (by changing the contents of the Apple Menu Items folder, which is inside the System Folder—L.P.). Unfortunately, once you add more than a few items to the menu it becomes a mess. Apple recommends putting a symbol (such as a + or *) before each name to organize the menu items by type. I think that looks silly and even more confusing.

To group different types of items, I add blank spaces before the items' names. (Most of the items are aliases.) I put three spaces before application program names, two spaces before document names, one space before folder names, and none before desk accessory names. Now items in the menu are arranged by category as I deem important, alphabetically within each category, and the extra spaces are not bothersome.

But a giant list arranged by type can be hard to scan quickly. To visually separate the different types of items, I made separators by naming extra aliases with hyphens and prefixing the names with the right number of blank spaces so each one would appear between two different types of items.

John F. Whitehead
via CompuServe

Aliases of the Finder would work well because accidentally opening one results in a message saying that item can't be opened. I use ordinary folders to make separators in the Apple menu.

To further refine your Apple menu, you can hide the icons of separators. First you copy some white space in any painting program. Next you select a separator item's icon and use the Get Info command to display the item's info window. Then you select the icon in that window and paste the white space over it (see "Orderly Apple Menu").—L.P. M

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Lon Poole answers readers' questions and selects their tips for this column. His two most recent books are Amazing Mac Facts *(Microsoft Press, 1991), a collection of the best published tips; and* Macworld Guide to System 7 *(IDG Books Worldwide, 1991).*



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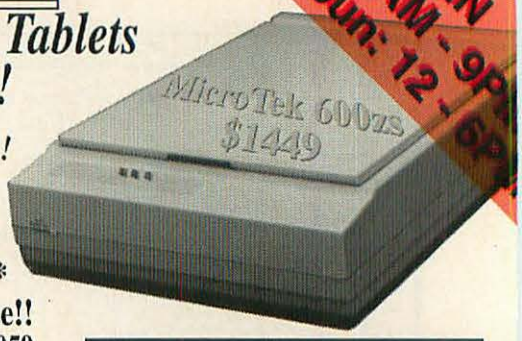
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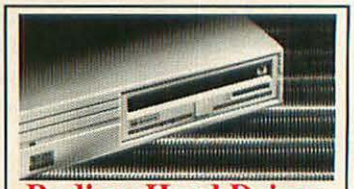
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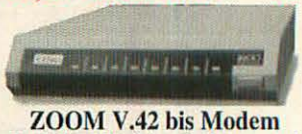


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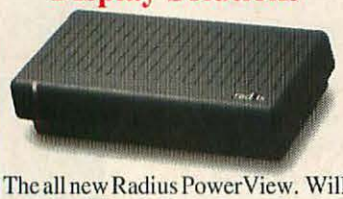
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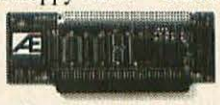
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Getting Started with Choosing a Mac

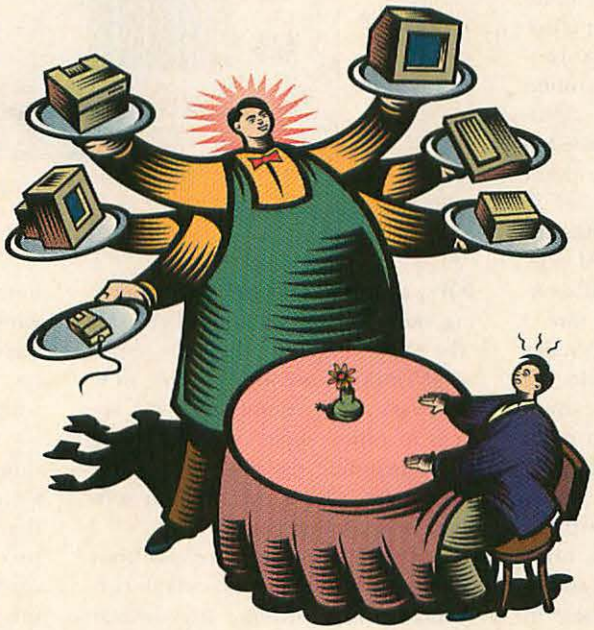
WHICH MAC IS FOR YOU? YOU SHOULDN'T DECIDE UNTIL YOU UNDERSTAND HOW THEY DIFFER.

BY JIM HEID

You've decided to buy a Mac. Ask a Mac aficionado which model you should get, and you may find yourself swimming in slanguage. "Get something with an 80-meg hard drive and at least 4 megs of RAM. You might want a NuBus down the road, and if you want to use VM under 7.0, get an 030, otherwise you'll need a PMMU."

For all the Mac's simplicity, it's still one of the most complex pieces of electronics you can buy. Roughly half a dozen components interact to affect a Mac's speed, video display characteristics, storage capacity, and expandability—including its connectors (see "A Guide to Ports and Connectors").

Knowing how Macs differ in these areas will make you better able to choose the one for you (see "Comparing Macs"). If you already have a machine, you may get some new insights into how it works and how it differs from other models in the growing Macintosh line.



PETER HOEY

The Central Processing Unit

Perhaps the Macintosh's single most influential component is the *central processing unit,* or *CPU*—the microprocessor chip that executes program instructions, shuttles data, and supervises the Mac's overall operation. The Macintosh line uses Motorola's 68000 microprocessor family. Within this tribe are five chips: the 68000, 68010, 68020, 68030, and 68040.

The 68010 isn't used in any Macintosh, but the rest reside in at least one machine. What's in a number? Quite a bit—quite a few bits, in fact. One area where each chip differs is in the amount of data (the number of bits) it can work with at a time. The 68020, 030, and 040 are *32-bit* processors—they can work with 32 bits of data at a time. The 68000 is a hybrid 16-bit and 32-bit processor: internally, it works with data in 32-bit chunks, but it exchanges data with the rest of the Mac's components 16 bits at a time. (The LC uses its 68020 in a similar manner, as does the Classic II with its 68030, even though both the 020 and 030 are true 32-bit chips.)

The phrase "at a time" refers to a single *clock cycle,* one tick of the metronome to which the computer's components dance. A Mac's internal clock ticks millions of times per second, and all other things being equal, the faster the *clock rate,* the faster the Mac. The slowest of the currently shipping Macs—the Classic—has a clock rate of 8 million cycles per second, or 8 *megahertz* (MHz). The fastest Macs—the Quadra 700 and 900—have a 25MHz clock rate. The Mac IIfx has a 40MHz clock rate—almost twice as fast as the Quadras, yet the Quadras are considerably faster than the IIfx. And that shows that all other things are often not equal—the Quadras' 68040 is more sophisticated than the IIfx's 68030, able to perform several tasks at once. The Quadras have other performance-enhancing components, too. In the end, a computer's clock rate is just one variable in the performance equation.

(continues)

Recommendations: A 68000-based Mac such as the Classic is fast enough for word processing and for using low-end software such as Aldus Personal Press and Microsoft Works. However, more sophisticated programs such as QuarkXPress, Aldus PageMaker, Adobe Photoshop, and Microsoft Excel require at least a 68020 or a lot of patience to run. Apple's System 7, the latest version of the Mac's system software, also delivers more satisfying performance on faster Macs. I recommend buying the fastest (and most upgradable) Mac you can afford, even if your present needs are simple. Such a machine—especially if you eventually upgrade it—will be able to meet your needs as they grow (and as software becomes more complex), and it's more likely to retain its value better should you decide to sell it.

Coprocessors

As in medicine, the trend in computers is toward specialization—toward *coprocessors,* microprocessors that free the CPU from performing complex math calculations and other grunt work. Unlike a general-purpose processor, coprocessors are finely tuned to perform specific jobs. Math coprocessors such as the Motorola 68882—found in most Mac II's and an option for the Mac IIsi and LC—excel at *floating-point* calculations, ones involving numbers with decimal portions. (The Mac Quadra's 68040 contains built-in floating-point circuitry.) Some programs—such as spreadsheet programs like Microsoft Excel and 3-D graphics programs like Aldus Super-3D—are designed to exploit a math chip. Heavy-duty scientific and statistical number-crunching programs—like Mathematica—cannot run without one. In most other programs, however, the math chip lies fallow, so unless you plan to crunch numbers in quantity, don't worry if your Mac doesn't have one.

The Mac IIfx has two *input/output processors (IOPs)* and one *SCSI/DMA Controller* that are designed to shepherd data between the computer's memory and hard drive and other add-ons. But having a coprocessor and using it are two different things. The Mac's system software doesn't take advantage of the IIfx's IOPs; and in the IIfx, their shepherding skills are all but unused. This is why Apple didn't use the IOPs or the SCSI/DMA Controller in the new Quadras. (Both components still appear in other Apple products, however, including the new LaserWriter IIf and IIg, whose own built-in software *does* exploit them.)

One type of coprocessor that does boost certain Macs' overall performance is a *graphics accelerator* such as that found on Apple's Macintosh Display Card 8•24 GC. It reduces the need for the Mac's CPU to be intimately involved in the process of creating screen displays, which becomes an unhealthy obsession when a Mac is equipped with *24-bit* video, the preferred hardware for photo-realistic retouching and publishing of color images. Without a graphics accelerator, the Mac's CPU must process so much data to create 24-bit images that windows appear to ooze onto the screen. By lightening the CPU's burden, a graphics coprocessor does away with this slow-motion video.

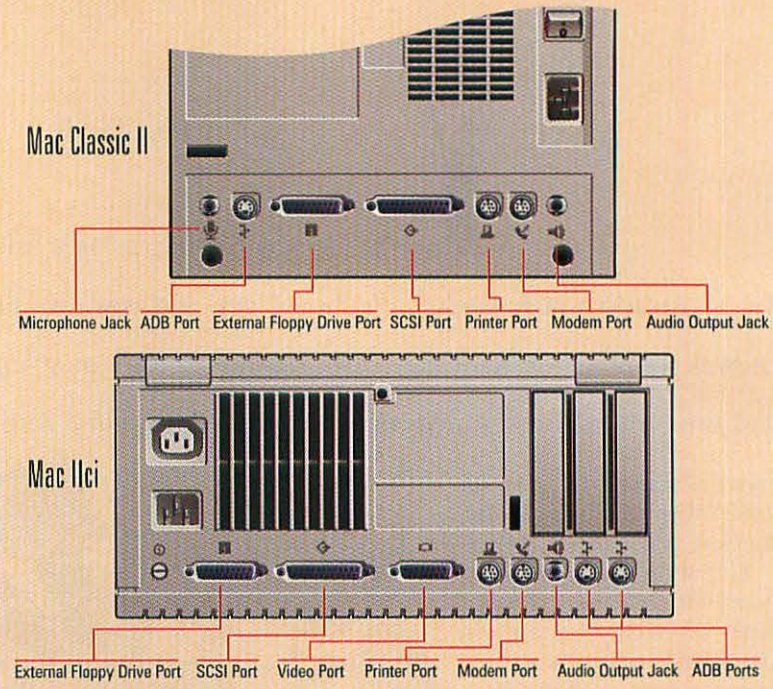
Recommendations: If heavy-duty number crunching or 3-D graphics won't be part of your computing life, don't concern yourself with math coprocessors. If 24-bit video is in the cards, however, strongly consider buying a graphics accelerator.

Video Variations

Video itself is another area where Macs differ. Most Macs have video circuitry built onto their main circuit boards: *on-board video.* Other Macs have on-board video but also accept plug-in video boards that you buy separately. Still others have no video circuitry at all, but require plug-in video boards. *(continues)*

A Guide to Ports and Connectors

- **ADB port:** For input devices; some Macs have two ADB ports, others have one.
- **Audio output jack:** For external speakers (for better sound quality).
- **External floppy drive port:** For floppy disk drive (not on all Macs).
- **Microphone jack:** For microphone for sound input (not on all Macs).
- **Modem port:** For telephone modem, printer.
- **Printer port:** For printer, LocalTalk network cabling.
- **SCSI port:** For (up to seven) external storage devices, scanners.
- **Video port:** For display monitor (not on all Macs).



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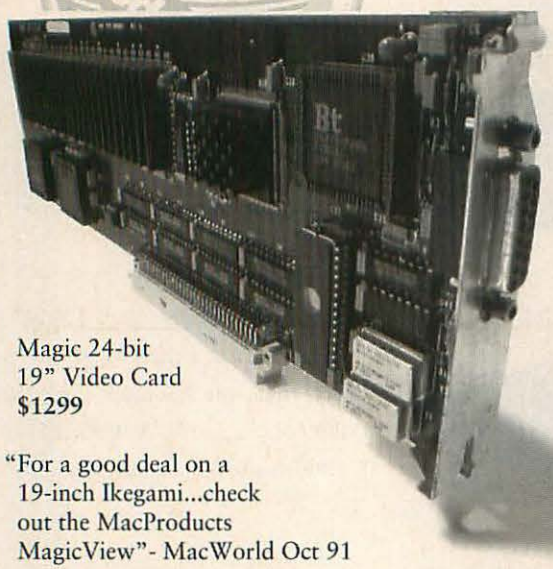
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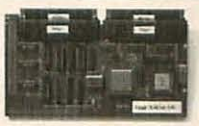
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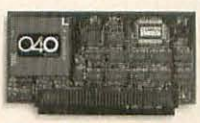
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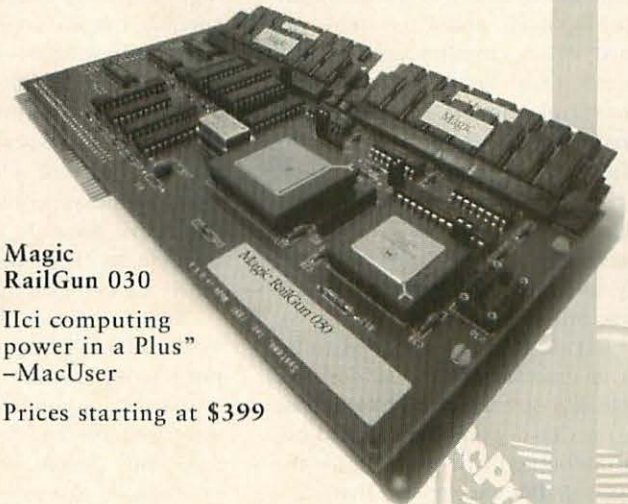
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COMPARING MACS

Model	Processor(s)	Display Features	Memory Included	Hard Drive	SIMM Slots	Expansion Slots
Classic	8MHz 68000	Built-in monochrome circuitry, 9-inch screen	1MB or 2MB	none or 40MB	2	none
Classic II	16MHz 68030	Built-in monochrome circuitry, 9-inch screen	2MB or 4MB	40MB or 80MB	2	none[1]
LC	16MHz 68020 68882 optional	Built-in color/gray-scale circuitry, (16 grays/colors, expandable to 256)	2MB or 4MB	40MB or 80MB	2	1 PDS
IIsi	20MHz 68030 68882 optional	Built-in color/gray-scale circuitry (256 grays/colors)	3MB or 5MB	40MB or 80MB	4	1 NuBus or PDS
IIci	25MHz 68030 25MHz 68882	Built-in color/gray-scale circuitry (256 grays/colors)	5MB	none, 80MB, or 160MB	8	3 NuBus, 1 cache
IIfx	40MHz 68030 40MHz 68882	none	4MB	none, 80MB, or 160MB	8	6 NuBus, 1 PDS
Quadra 700	25MHz 68040	Built-in color/gray-scale circuitry (256 grays/colors, expandable to millions)	4MB	none, 80MB, or 160MB	4	2 NuBus 90, 1 PDS
Quadra 900	25MHz 68040	Built-in color/gray-scale circuitry (256 grays/colors, expandable to millions)	4MB	none, 80MB, or 160MB	12	5 NuBus 90, 1 PDS
PowerBook 100 (5.1 lbs.)	16MHz 68000	Built-in monochrome circuitry, 9-inch backlit screen	2MB	20MB	none[2]	none
PowerBook 140 (6.8 lbs.)	16MHz 68030	Built-in monochrome circuitry, 10-inch backlit screen	2MB or 4MB	20MB or 40MB	none[2]	none
PowerBook 170 (6.8 lbs.)	25MHz 68030 25MHz 68882	Built-in monochrome circuitry, 10-inch backlit, active matrix screen	4MB	40MB	none[2]	none

[1] The Classic II lacks a general-purpose expansion slot, but has a specialized slot for accepting a math coprocessor or ROM upgrade. [2] Although the PowerBooks have no SIMM slots, memory can be upgraded with a dealer-installed memory-chip board that adds from 2MB to 6MB.

The compact Macs—the Classic and Classic II, as well as the discontinued SE/30, SE, and Plus—have on-board video circuitry and built-in screens. Ditto for the portable Mac PowerBooks and the defunct Macintosh Portable. Compared to the others, the compact and portable Macs have primitive video features. Their *monochrome* (black-and-white) screens can't display true shades of gray, an important capability for electronic image retouching. The Classic and Classic II aren't designed to accept an external monitor; several non-Apple add-ons allow you to graft one onto a Classic, and similar add-ons will undoubtedly be released for the Classic II. But they're less-than-ideal alternatives that still provide no true gray, or *gray-scale,* displays.

All other Macs except the IIfx (and the discontinued IIcx, IIx, and II) have on-board color and gray-scale video circuitry, but also accept plug-in video boards. These Macs' cleverly designed video circuitry enables them to drive a variety of different-size screens, which you must buy separately. Moreover, the on-board video in the LC and Quadras is expandable: by adding inexpensive memory chips, you can upgrade an LC or Quadra to display more colors on certain monitors.

If you already have on-board video, why would you want an additional video board? The main reason is to add a second monitor to your system—to enlarge your digital desktop. Many people like to position a program's tool palettes on the smaller monitor and put document windows on the larger one. Or they may use a monochrome monitor for word processing (monochrome screens produce the sharpest text) and a color one for illustration programs. The Mac's skill at juggling multiple monitors is remarkable. You can drag windows from one monitor to another and position windows to span multiple monitors, even if they have different color or gray-scale capabilities.

With the Mac IIsi and IIci, adding a video board improves the Mac's performance. These Macs have a unique video design in which some of the machine's main memory is used to hold the video image. This scheme helps keep the machines' costs down, but slows performance. In tests performed by Macworld Lab (see "Mac IIsi," December 1990), a IIsi with a video board was almost twice as fast in its 256-color display mode as a IIsi without one. Adding a video board

and using on-board video in its monochrome mode also frees up memory that you can use to accommodate today's memory-hungry software.

Recommendations: Unless you buy a Mac IIfx, you don't have much choice—you get on-board video whether you want it or not. But if you buy a Mac IIci or IIsi, keep in mind that you can boost performance—especially when working in 256-color mode—by adding a video board. As for monitors, consider looking beyond the standard 12- or 13-inch monitors to something better tailored to your work. (For a comparison of 24-bit color monitors, see "24-Bit Monitors: Fast and Functional," in this issue.) For example, if you do a lot of word processing, consider a full-page display such as Apple's Macintosh Portrait Display or Radius's Full Page Display, both of which let you view an entire letter-size page without scrolling. Two particularly versatile monitors are Radius's Pivot and Color Pivot, 15-inch displays whose screens rotate between horizontal and vertical orientation. For page layout, image retouching, or electronic drafting, consider a two-page display such as Apple's Two-Page Monochrome Monitor or Radius's TPD/19 (see "Solving the Monitor Mystery," *Macworld,* May 1991.) Portrait-size monitors often work with the built-in video circuitry that most Macs have, but two-page displays require separate video boards.

Memory: RAM versus Disk

What about memory? It's half of the storage equation, one area that often trips up new users. Macs, like all computers, provide two types of storage: memory and disk. Memory itself is also divided into two types: random-access memory (*RAM*) and read-only memory (*ROM*). As its name implies, ROM can be read from, but not written to. A Mac's ROM—which resides in several chips on the Mac's main logic board—contains essential system software the Mac uses as it runs. Generally, you need not concern yourself with ROM when shopping for a Mac. When people talk about memory, they usually mean RAM. RAM is short-term storage—a Mac's RAM chips lose their contents as soon as the power goes

(continues)

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off. Disk storage is permanent: once you save something on disk, it stays there until you throw it away (or some dreaded mishap occurs). Copying a program to your hard drive doesn't cause it to use any of the Mac's RAM—that doesn't happen until you actually start the program.

Perhaps it's easy to confuse memory with disk storage because both are measured in the same way: in millions of bytes, or *megabytes* (MB). Most Macs come with between 2MB and 5MB of memory and can accept additional memory through plug-in boards called *Single In-line Memory Modules,* or *SIMMs.*

As for disk storage, most Macs include an internal *hard drive* that holds 40MB, 80MB, or 160MB. The entry-model Mac Classic contains just 1MB of memory and one *SuperDrive,* a floppy drive that reads high-density (1.4MB) disks. The IIci, IIfx, and Quadras are also available without hard drives. You can add an internal or external hard drive to any of these machines. Or you might want a *removable-media* drive such as a SyQuest drive or one of Iomega's Bernoulli drives, which use removable cartridges that hold 90MB.

There is another kind of memory that fuels the memory-versus-disk confusion: *virtual memory,* sometimes abbreviated VM. Virtual memory is a system software trick whereby the Mac treats part of a hard drive as RAM, enabling you to simultaneously run more programs than would otherwise fit in memory. System 7 has a virtual memory option. You can add virtual memory capabilities to earlier system software versions using Connectix Corporation's Virtual software. Virtual memory requires a piece of hardware called a *Paged Memory Management Unit,* or *PMMU.* A PMMU is built into the 68030 and 68040 processors, and is available as a separate chip for the Mac LC and original Mac II. Macs containing 68000s can't use virtual memory.

Recommendations: I recommend at least 4MB of memory to avoid annoying "out of memory" messages and to take full advantage of System 7. Virtual memory, despite its usefulness, isn't a panacea for cramped RAM. It's much slower than the equivalent amount of real memory, and it gobbles storage space that could otherwise hold programs or documents. As for hard drives, consider one that stores 80MB or more if you plan to work with a large number of programs or with gray-scale or color images.

Expansion Slots: Growing Room

Being able to add additional video boards and memory to a Mac are just two ways you can add to your computing capabilities without buying a new machine. But these and other enhancements wouldn't be possible were it not for internal receptacles called *expansion slots.* Slots provide a way to tap into a Mac's *bus,* the internal pathway on which information flows between the Mac's components.

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All Macs have slots for accepting memory upgrades, but beyond that, their expandability varies. The Mac Classic and Classic II lack expansion slots; the accelerators and video boards available for them must connect using a tricky clip that attaches to the CPU itself—a backdoor scheme that has potential reliability problems.

Every other nonportable Mac offers at least one slot, and uses one or both of two different designs: *Processor Direct Slot* (PDS) or *NuBus*. A Processor Direct Slot is essentially a legitimized version of the processor clip just described; it's a slot whose connectors provide direct access to all of the CPU's pins. NuBus slots are more sophisticated, offering additional signal lines that, among other things, enable boards to configure themselves when you switch on the Mac.

Within the PDS and NuBus camps are some subtle variations. The PDS in the LC differs from its counterparts in 68030-based Macs. And the new Quadras' *NuBus 90* slots are able to transfer data at twice the speed of older NuBus slots. The Quadra 900 can also accommodate larger NuBus boards than can other Macs.

Recommendations: One expansion slot is generally adequate, especially since most Macs include on-board video. If you plan to tackle hardware-intensive applications such as multimedia and desktop video, however, you're likely to need more slots to accommodate digital audio and extra video boards. That narrows your choices to the Mac IIci, IIfx, and Quadra series.

Other Buying Considerations

Other factors besides the ones I've described here may influence your decision. One is the ability to upgrade to a more sophisticated model. The Mac IIci can be upgraded to a Quadra 700 and a Classic can grow into a Classic II, but no similar upgrade paths exist for other currently manufactured Macs. (They do exist for many discontinued models, however: a IIcx can become a IIci or a Quadra 700; an SE can become an SE/30; and a II or IIx can become a IIfx.)

And finally, what about all this Apple-IBM hoopla? Should you postpone buying a Mac to see what comes from this latest installment of The Odd Couple? Not by a long shot—unless you can wait several years. What's more, the machines that result from this union will bring with them a new torrent of jargon: If you want to run the OOPS-based Pink OS, you'll need a RISC machine.

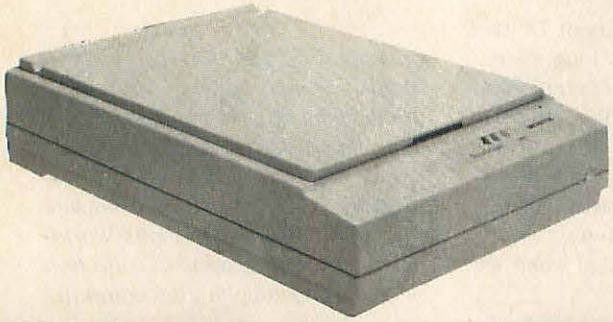
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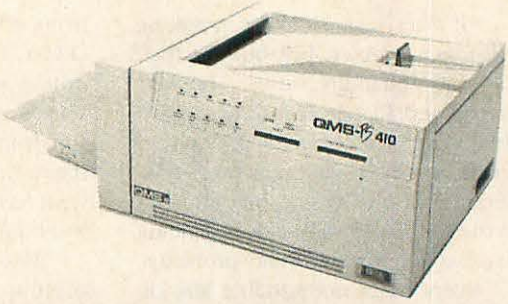


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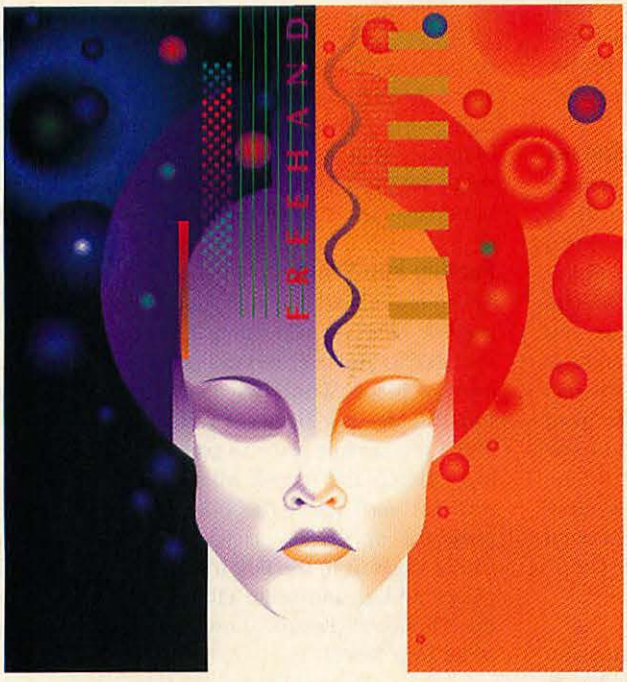
Insights on FreeHand 3.0

TIMESAVING TIPS AND OTHER TRICKS TO STEADY THE ARTIST'S HAND

BY DAVID POGUE

The state of Mac graphic arts took a great leap forward last March when Aldus FreeHand grew up to version 3.0. The interface has become more accessible with the introduction of floating palettes for color, layers, and styles. The program now runs and prints faster and is more stable than ever before; more of the program is customizable; and almost every feature has been polished or enhanced.

Some of the tips that follow come from two awesome sources: *Macworld*'s own info-artist, senior designer Arne Hurty, and Aldus Corporation's Olaf Martin Kvern, whose immense wit and wisdom packs the pages of his paperback *Real World FreeHand,* published by Peachpit Press (1991).



MARK JASIN

Olaf's Top Ten Tips for Printing

Here's how to minimize the almost inevitable delays, "out of memory" messages, and PostScript errors you'll encounter when printing complex FreeHand documents. The authenticity of these golden rules is backed by countless buckets of blood and sweat, and many eleventh hours at service bureaus. Ignore them at your peril.

- Where possible, use blends instead of graduated fills. The effect is similar: a smooth, gradual change in shading from one side of an object to another. But a graduated fill taxes a printer much more than does a blend, which is actually a series of adjacent copies of an object, each a different shade. Blends give you more control over the rate of shading change, and they look better on screen.
- Don't make a document's page size any larger than it has to be. Even if the extra space is blank, it slows printing to a crawl by using up the printer's memory.
- Raise the *flatness.* Every line you draw has an associated PostScript accuracy setting, called flatness, which you edit by selecting the path and opening the Element Info dialog box (⌘-I). By setting this PostScript variable to, say, 3 instead of 0, you can speed printing by up to four times—and save precious printer memory—without notably affecting image quality, even on very high-resolution printers.
- Eliminate superfluous points from paths. Complex paths that result from autotracing images are especially troublesome. When the number of points defining a path approaches 100, it is time to either simplify the path or split it.
- Don't import FreeHand EPS files. If you need to transfer elements from one FreeHand document to another, use the Copy and Paste commands instead of exporting and then importing an EPS file. (Group the desired objects first, if you like.) You'll drastically cut down on printing time.
- Turn on Unlimited Downloadable Fonts in the Aldus FreeHand Defaults file. Choose Page Setup from the File menu, and click on the Options button to do this. You'll avoid a lot of PostScript errors and salvage many seemingly unprintable documents.

Editing Text Converted to Paths

Have you ever seen FreeHand demonstrated? The Aldus folks always show you how to make neat, instant logos by converting a text block into editable FreeHand outlines and then

(continues)

manipulating the outlines. Well, this trick works only on fonts for which the PostScript printer file is in the System Folder. In addition, you must select the text block and choose Convert to Paths from the Type menu. To begin editing, you then have to choose Split Elements from the Element menu *twice:* once to separate the characters of the text block, and a second time to make the individual paths editable.

Cranky Exported EPS Files

And speaking of text-to-path conversion: almost everybody has trouble printing EPS files that have been imported into PageMaker and other page-layout programs. One typical reason: the imported files contain downloadable fonts, which don't always get along with EPS files.

The workaround? Use Convert to Paths to turn text into outlines while you're still in FreeHand. This eliminates downloadable fonts from the file altogether, letting it print even faster.

The Cropping Tool Nobody Knows

You can crop imported TIFF files (or any other graphics) just as easily in FreeHand as in PageMaker, once you know how to access FreeHand's secret cropping tool. Just draw a rectangle around the part of the TIFF image you want. Select the entire image and cut it to the Clipboard; then select the rectangle and choose Paste Inside from the Edit menu. Only the part of the image that fits in the rectangle will be visible. To adjust the cropping, drag the handles of the rectangle. For even wilder effects, see "Cream of the Crop."

Trans-Object Fills

No doubt you've used the amazing Join command to cut holes in shapes or bind text to a curve. Here's a useful fact: if you join several objects, you can create a single gradient or radial fill that traverses all of them, as though they were all cut out of one piece of cloth. If you unjoin them (with the Split Element command), each object receives the complete gradient, start-to-finish within each shape.

Drawing Adjacent Objects

To draw two shapes that share one boundary—especially if it's an irregular one—try this quick, easy shortcut. Select the first shape; clone it (⌘-equal sign [=]); grab the handles on the boundary that is not shared and flip them to the far side of the shared boundary (see "Out of Bounds").



CREAM OF THE CROP FreeHand's little-known cropping feature lets you create some great effects. Create some text, use the Convert to Paths command, then drag the resultant outlines on top of a TIFF image or another FreeHand object. Cut the TIFF image (or object) to the Clipboard, select the text outlines, and choose Paste Inside from the Edit menu. Adjust the cropping by dragging the outlines' handles.

Pasting into Word

This one is an old chestnut, but it's so good it deserves repeating. Did you ever try to paste FreeHand graphics into Microsoft Word? What a shame that the Mac just beeps at you, since Word is a perfect place to paste your logo. Here's the secret: when you're in FreeHand, select the object, and press the option key as you choose Cut or Copy from the Edit menu. This places a black-and-white PICT file on the Clipboard. Presto—now you can paste into Word!

Subselecting and Selecting through Objects

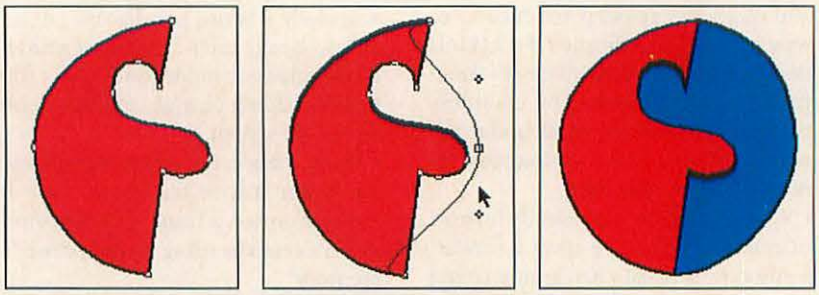
If you're trying to select an object that's lying behind another object, remember that pressing the control key while you click lets you select right through whatever is on top. A similar trick: if you've grouped a bunch of objects, you don't have to ungroup them just to change or move one part. Just option-click to select something without removing it from its group. (By the way, you can combine these techniques: control-option-click selects one item in a group that's hidden by other objects.)

Making Life with Layers Easier

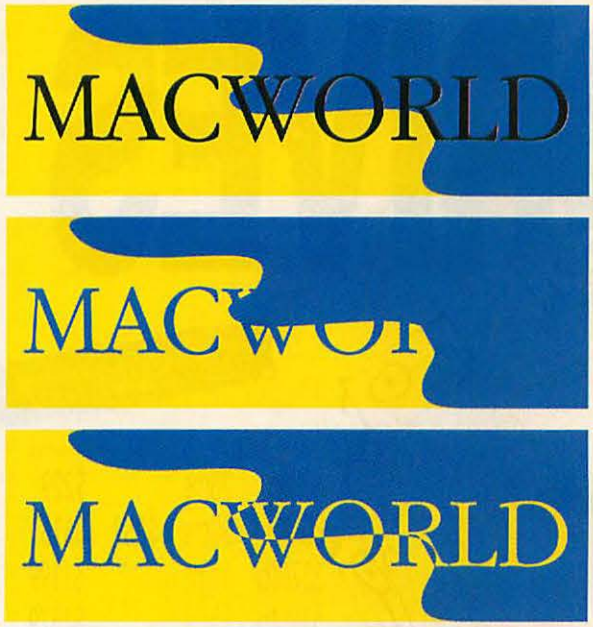
When you're working on a document with elements in several layers, consider turning off the Multilayer option (it's in the Layers palette pop-up menu). When Multilayer is turned off, only the selected layer is editable, but you can still see everything. This trick prevents you from accidentally selecting or moving anything on the other layers, and it's much faster than locking everything.

Techie Text-Trapping Tips

Trapping is vital if you're going to print in color. Briefly, it's the art of carefully overlapping adjacent objects of different colors, to prevent glimpses of paper from showing through due to slight misalignments in the printing process. FreeHand does have a Spread option (in the Print Options dialog box), which is supposed to add a user-definable amount of extra ink around the edges of every basic object, thus trapping automatically. But the Spread feature doesn't work on graduated fills, custom PostScript lines or fills, or—most unfortunately—type.



OUT OF BOUNDS To create a new shape that shares an irregular boundary with an existing one, clone it to place a duplicate directly atop the original (left). Now drag the nonboundary handles off the original (center). Fill and adjust the new shape (right) to your heart's content.



FANCY TWO-COLOR TEXT EFFECTS Create two paths of contrasting colors (black and white work well, too). Add a text block that crosses the boundary. Change the text block to the darker color. Clone it, then press ⌘-X to cut the clone. Select the light-color shape and choose Paste Inside from the Edit menu. Select the text block, change it to the lighter color, and cut it to the Clipboard. Select the dark shape and choose Paste Inside again. Voilà!

Here's a trick for trapping type.

Select the text block, and open the Type Specifications dialog box (⌘-T). From the Text Effect pop-up menu, choose Fill and Stroke (the Fill and Stroke command in the Attributes menu is dimmed when type is selected). Now set the stroke width to twice the amount of the spread you want. Set the stroke, but not the fill, to Overprint. If the text color is darker than the background, make the stroke color match the text. If the text color is lighter than the background, make the stroke color match the background. (In the latter case you actually create a *choke,* meaning that you cut a hole in the background color to accommodate the type's ink.)

Tips for the Speed Demon

FreeHand's an awesome program, but wow, can it get slow, especially in color. When the deadline nears, it's time to crank out every ounce of speed, as follows:

- On complex documents, work in keyline view as much as you can stand. Preview mode takes forever to redraw the screen. And work with the monitor in black and white until as late in the game as possible.
- Diligently hide layers you're not working on. Remember to click to the *left* of a layer's name in the Layers palette, to toggle its visibility.
- Use a macro program like CE Software's QuicKeys[2] to assign keyboard shortcuts to commands you use often. Blend (Element menu), Styles (Attributes menu), Split Element (Element menu), and the various text-alignment commands are obvious candidates. So are the Layer palette's All Off and All On commands; trouble is, QuicKeys has trouble with the little palette pop-up menu. But as long as you define the All Off/On QuicKeys to be Layers window–specific, and you do not resize the Layers palette (you can move it, however), the macro will work.

And here is another Olaf Martin Kvern Special: write a QuicKeys[2] macro that kerns (presses ⌘-shift–left arrow) and then clicks on the Apply button in one fell swoop. Not only do you save a step, but you can also choose a more mnemonic kerning keyboard shortcut than ⌘-shift-arrow.

Sharing the Wealth

If you've found a tip or a shortcut not mentioned here, spread the word to other *Macworld* readers by sending it to *Quick Tips, Macworld,* 501 Second St., San Francisco, CA 94107. M

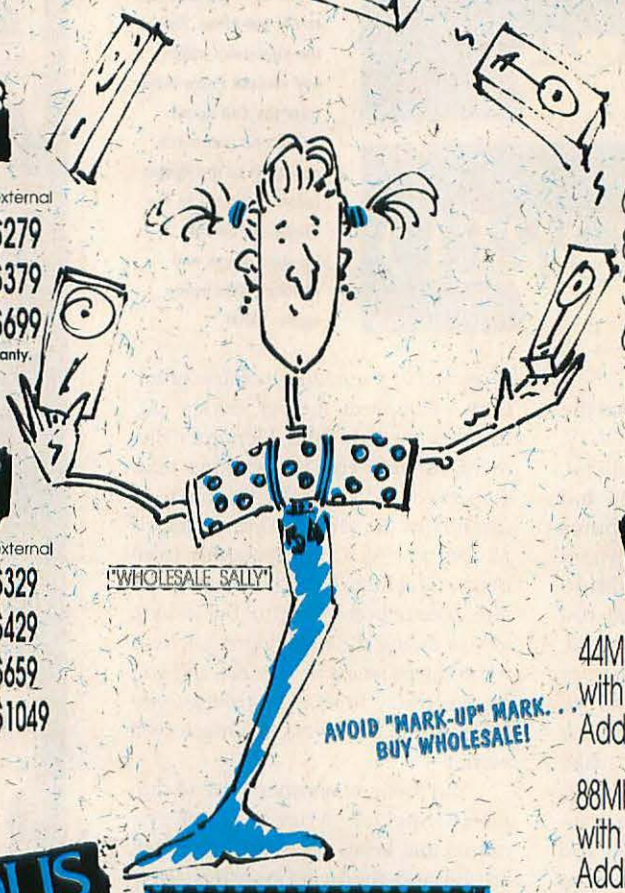
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Since contributing editor David Pogue moved to New York City, the terms trapping, choking, *and* bleeding *have taken on a whole new meaning for him.*



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BHA

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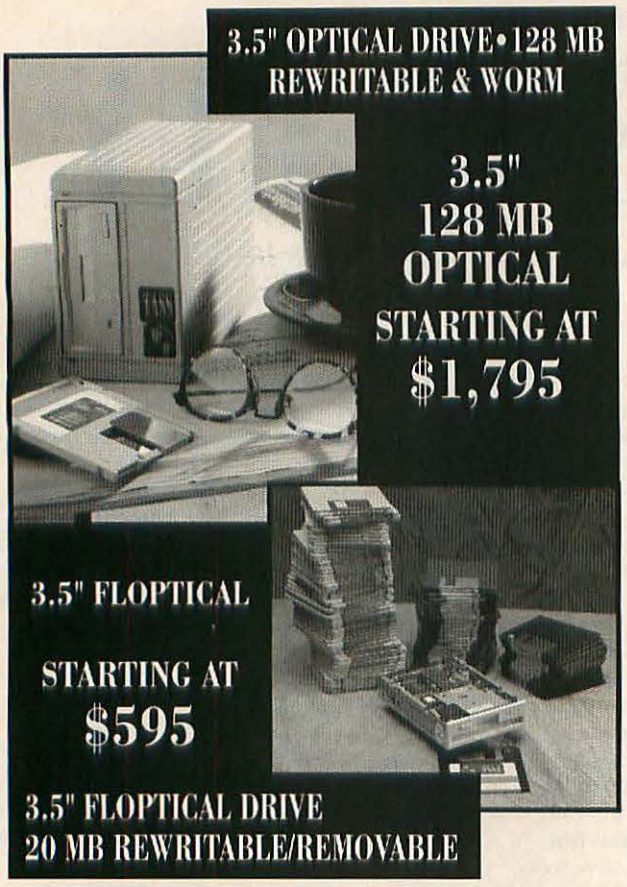
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February 26-28/Conferences February 27-28/Expo Los Angeles Convention Center

You

won't believe

what you can see

what you can do

what you will learn

The most important multimedia expo and conference in the world will premier in February at the L.A. Convention Center. But there's one thing you need to do immediately – preregister before February 1. Not only will you save $10 to $100, you'll also save time.

MEDIA '92 is an exhaustive and unbiased source for new information on all the multivendor hardware, software, services and projects available to the multimedia user and developer. In the exhibition center, you can experience the most exciting and significant products available now and on the horizon. Attend one of the two conference series and you will see the future of multimedia in a multiplatform environment with offerings for Macintosh, DOS, UNIX, OS/2, Amiga, and other workstations. There will be hands-on demonstrations and breaking information you can't find anywhere else. MEDIA '92 is sponsored by *Macworld* magazine.

MEDIA '92

TWO CONFERENCE SERIES

The two MEDIA '92 conference series are designed for two levels so you can get the information you need most.

Multimedia: Maximum Power for Maximum Payback

An Intensive Conference for the Serious Media Professional

February 26, 1:30 p.m. to 5:30 p.m.
February 27-28, 8:30 a.m. to 5:00 p.m.

For: *Developers, Videographers, Graphic Designers, Producers, Advertising Agencies, Production Houses, Communication Specialists, Artists, Animators, Musicians*

News The latest high- and low-end multimedia product information worldwide.

Vendors What's hot, what's not, what's next.

Results Insider techniques for achieving your goals and getting maximum power from your current multimedia configuration.

Trends An informed perspective on the key issues in multimedia today. Includes crossplatform standards development, videoconferencing, the major players and the coming impact of multimedia networking.

Case Studies Award-winning multimedia projects, how they were created, how their developers succeeded.

Investments Making the right choices in a fast changing environment.

Networking Meet multimedia leaders from around the world to exchange ideas and gain invaluable insights.

Multimedia Magic on a Shoestring

For the Small-scale User Seeking Basic Information

February 27-28, 10:00 a.m. to 5:00 p.m.

For: *Advertising and Graphic Users, Educators and Training Specialists, Sales and Marketing, Science and Engineering Users, Entrepreneurs, Small Scale Production Services*

Savings The ultimate information source on low-cost multimedia tools from all the vendors in the marketplace.

How To Start creating your own low-cost multimedia presentations.

Demonstrations Examples of the best low-cost multimedia presentations in the world.

Breakthroughs The latest multimedia technologies in plain English: CD-ROM, artificial intelligence, hypermedia, DVI compression, CD-I and more.

Applications Understanding classic and new uses of multimedia as a productivity tool for every desktop.

Users Forum Specific applications of multimedia to your own situation and needs.

Preregister today and save $10. to $100.

The Multimedia Theater

Continuous showings of the best and the brightest multimedia presentations from around the world. You'll better understand the tactics behind the technologies when you see the innovations pushing multimedia to the ultimate extreme.

Getting There Save 5% to 45% when you fly American Airlines, the official airline for MEDIA '92. Make your reservations by calling 1-800-433-1790 and ask for Star File #S-0222AL.

You'll also receive special discounts when you rent a car from Avis. Just call 1-800-331-1600 and ask for Worldwide Discount #B464351.

Hotels Rooms are priced for single and double occupancy.

Holiday Inn Convention Center 1020 S. Figueroa St., Los Angeles, 213-748-1291 $82/$82

Los Angeles Hilton & Towers 930 Wilshire Boulevard, Los Angeles, 213-612-3921 $115/$130

Los Angeles Hyatt 711 S. Hope Street, Los Angeles, 213-683-1234 $115/$130

Registration Hours
February 26, 12:30 p.m. to 5:30 p.m.
February 27-28, 8:00 a.m. to 5:00 p.m.

Conferences
Multimedia: Maximum Power for Maximum Payback
February 26, 1:30 p.m. to 5:30 p.m.
February 27-28, 8:30 a.m. to 5:00 p.m.
Before February 1, $595.00,
At Door, $695.00

Exhibits Only
February 27-28, 10:00 a.m. to 5:00 p.m.
Before February 1, $15.00, At Door, $25.00

Multimedia Magic on a Shoestring
February 27-28, 10:00 a.m. to 5:00 p.m.
Before February 1, $75.00,
At Door, $90.00

For more detailed conference information, call 617-361-1031.

Send in this form by February 1 to preregister for MEDIA '92. By preregistering you will qualify for significant discounts on the exhibition and conference. You'll save $10 to $100, and be guaranteed admission even in the event of a sell-out.

Please choose the most appropriate package and completely fill out the form below. Please do not staple check to form. **Send completed forms to: MEDIA '92, P.O. Box 4010, Dedham, MA 02026.** Registration forms received after February 1 will be returned. Purchase orders cannot be accepted. Registration fees are nonrefundable.

Please register me for:

☐ **Package One $595**
Maximum Power for Maximum Payback plus Exhibits
Preregister by February 1 ($695 at door).

☐ **Package Two $75**
Multimedia Magic on a Shoestring plus Exhibits
Preregister by February 1 ($90 at door).

☐ **Package Three $15**
Exhibits Only
Preregister by February 1 ($25 at door).

Entry Badges Maximum Power conference badges will be available for pick-up at the L.A. Convention Center beginning February 26, 12:30 p.m. to 5:30 p.m., and throughout operational hours, February 27-28. All other badges will be mailed on or around February 10, 1992.

Please send my registration badge and further information to:

Please check one: ☐ Home Address ☐ Company Address

Last Name _____ First Name _____
Street Address _____
City _____ State _____ Zip _____-_____
Country (other than US) _____ Telephone _____-_____-_____

If mailing to company address:
Title _____
Company _____

☐ Check enclosed (make payable to MEDIA '92) ☐ MasterCard ☐ Visa ☐ American Express Amount $ _____
Account Number _____ Expiration Date (include all numbers) ____/____ ____/____

Card Holder Signature (Signature necessary to be valid) _____

If card holder is other than registrant, please print cardholder's name below:
Last Name _____ First Name _____

After February 1, you must register at MEDIA '92.

Please check the appropriate information:

Your Industry or Profession
01. ☐ Manufacturer (non-computer)
02. ☐ Manufacturer (computer industry)
03. ☐ Distributor/dealer/retailer/service
04. ☐ Business
05. ☐ Legal services
06. ☐ Communications/publishing
07. ☐ Education
08. ☐ Government
09. ☐ Consultant
10. ☐ Transportation
11. ☐ Information services
12. ☐ Utilities
13. ☐ Engineering
14. ☐ Health services
15. ☐ Other (specify) _____

Your Title
16. ☐ CEO/president/owner
17. ☐ DP/MIS manager
18. ☐ Manager/department head
19. ☐ Network manager
20. ☐ Programmer/analyst
21. ☐ Engineer/R&D
22. ☐ Consultant
23. ☐ Marketing/sales
24. ☐ Educator
25. ☐ Art director/graphics
26. ☐ Editor/writer
27. ☐ Other (specify) _____

Organization Size (number of international and national employees)
28. ☐ Under 50
29. ☐ 50-99
30. ☐ 100-499
31. ☐ 500-999
32. ☐ 1,000-5,000
33. ☐ Over 5,000

What multimedia platforms are most applicable?
34. ☐ Macintosh
35. ☐ DOS
36. ☐ UNIX
37. ☐ OS/2
38. ☐ Amiga
39. ☐ Workstation
40. ☐ None
41. ☐ Other (specify) _____

MEDIA '92

"Asking whether or not multimedia computing lies in our future is a bit like our grandparents' wondering whether or not movies should have sound. It's not a question of if, but when."

MACWORLD

FUJITSU

Unbeatable Quality and Performance

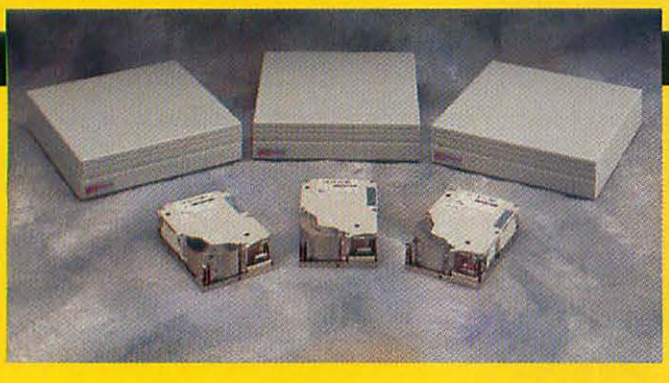
Fujitsu Special!

Fujitsu 330 Internal.....$1198
Fujitsu 425 Internal$1298
Fujitsu 520 Internal.....$1398

- 5 Year Warranty!
- 200,000 Hours MTBF
- 9ms access time!
- Incredibly Fast & Reliable!
- Perfect Internal for all Macs!*

Fujitsu is the second largest computer company in the world. With 20 Billion dollars in revenues (10% of which goes into research and development), Fujitsu is the IBM of Japan. We have sold thousands of Fujitsu drives and have found there quality and performance second to none. Quality like Mean Time Between Failures of 200,000 hours (22 YEARS!) and speeds of 9ms put them at the head of the storage pack.

Give one of these great drives a thirty day test drive, if you don't like it send it back for a full refund.



FUJITSU 3.5" 520, 425, 330mb... State of the art performance

	Internal	External
330 MB 3.5" Half Hght 9ms	$1198	$1298
425 MB 3.5" HalfHght 9m	$1298	$1398
520 MB 3.5" Half Hght 9ms	$1398	$1498

- Perfect internal for the Quadra, SE, CX, CI or FX.
- Incredibly fast! These drives are the quickest 3.5" we have tested
 - 4,400 RPM Rotational speed
 - 5 MB/s Data transfer rate (sync)
 - 256K Data buffer for incredible throughput speeds!
 - 9ms effective access time, 3ms track to track access
- 5 year warranty! 200,000 Hours Mean Time Between Failure! (That is 22.89 years of continuous 24 hour usage!)
- Support A/UX, System 7
- All 3.5" External cabinets include a 40 watt power supply, dual AC outlets, and cable.



FUJITSU 1.2 Gig, 680mb...High performance, High Capacity

	Internal	External
680mb Hard Drive	$1288	$1388
1.2Gig Hard Drive	$1988	$2088

- MacWorlds Fastest 1.2 Gig drive (July 1991)
- Supports A/UX and System 7
- Transfer rate 4.8 Sync, 2.0 assync
- Average access time of 11.5 (1 Gig)
- 5 year warranty! 200,000 Hours Mean Time Between Failure! (That is 22.89 years of continuous 24 hour usage!)

External 5.25"Drives incl. 65 w. power supply, cables, and ext. terminators.

FUJITSU 45, 90, 135, and 185mb...High Performance, High Reliability and Great Prices!

		Internal	External
45 mb	3.5" Low Profile/Low Power 3yr warr, 50,000MTBF	$188	$248
90 mb	3.5" 3yr warr, 50,000 MTBF	$298	$368
135 mb	3.5" 3yr warr, 50,000 MTBF	$378	$448
185 mb	3.5" 3yr warr, 50,000 MTBF	$498	$568

- Incredibly reliable! Less than .0006% returned on the 45mb!
- Support A/UX, System 7,
- Transfer rates up to 1.8mbs Sync
- Average access times of 14ms
- 50,000 hours Mean Time Between Failure, (That's 5.7 years of 24 hour a day operation!)
- Three year warranty



MAC DIRECT

60 East Chestnut - 145, Chicago, IL 60611
Visa, Mastercard, Amex, COD, Telecheck Approved Checks, Gov., Corp., Univ., P.O.s welcome All new Drives, Preformatted with latest stable system software , Factory warranty, / Bracket, cables and software included/
30 Day Money back Guarantee on all drive products.

800-621-8467
Hours: 8:30 - 8:00 CST, Saturdays 10:00 - 4:00
Technical Service and Order Tracking call:
312-664-8225

MACDIRECT

Specialists in Mac Storage

Monitor Special!

Phillips 20" Color
W/RasterOps 8 Bit $1498
W/Natl Semi. 24 Bit $2298
GoldStar 14" Color
Direct into LC, SI, CI $368
NEC MacSync 14" Color
Direct into SI, CI $438



- All 3.5" Drives are available in zero footprint (including a 40watt power supply, and dual AC outlets), or micro cabinets as well as internal for all Mac's.
- All 5.25" Drives are available in zero footprint external (including a 65 watt power supply, cables, and ext. terminators) or as internals for the Mac II, IIx, and IIfx.

Introducing Hitachi 3.5" & 5.25" Drives

	Internal	External
425MB 3.5" 5 year warr., 150,000 MTBf* 13ms Access	$1098	$1198
1.6 Gig 5.25" 5 year warr., 150,000 MTBf* 12ms Access	$2798	$2898

* Mean Time Between Failure is the average life expectancy of a drive.(In case of a 200,000 MBTF, this means a potential of **24 years** of 40 hour weeks, 52 weeks per year!)

Quantum 3.5" & Wren 5.25 Drives

	Internal	External
Q 52MB 3.5" LPS	$248	$338
Q 105MB 3.5"LPS	$368	$448
Q 120MB 3.5"	$448	$548
Q 170MB 3.5"	$598	$688
Q 210MB 3.5"	$688	$748
Wren 337 MB RUNNER	$1398	$1498
Wren 600MB F/H	$1598	$1698
Wren 630MB RUNNER II	$1998	$2098
Wren 1.2 Gig	$2298	$2398

Archive DAT Tape Backup

WangDAT 1.2 Gig Capability.....$1498
ArDAT 2.2 Gig Capability.....$1398

- Up to 10 mb per minute backup time
- Includes SoftBackup II for Fast network and unattended backup capabilities

SyQuest! 44MB & 88MB Removables

44MB REMOVABLE.....$448.00
88MB REMOVABLE.....$648.00

- 19ms Access time
- Both Drives include Cartridge
- 40Watt power supply
- SCSI Select and 2 Year Warranty



Ricoh Optical

600 MB Optical.....$1998

- Read/write reliable storage
- 66ms Access Time
- Great for archiving, color scans etc.

Introducing CD ROM Toshiba & Chinon

Toshiba 3301 External $568

- Includes Driver, CD carrier and cables
- 325ms access time, 2 year warranty

Chinon CDC-431 (Includes Audio Remote Control)$598

- Includes Driver, CD carrier and cables
- 350ms access time, 1 year warranty
- Includes 12 function audio remote control, usable even with your Mac off!



Introducing 14" Monitors

14" GoldStar Color System.....$368
*3 year warranty on tube!

14" NEC Color System.....$438

14" Sony Trinitron Color.....$668

The GoldStar and Sony monitors are plug compatible with the Mac LC, IIsi, and CI. The NEC monitor is plug compatible with the Mac IIsi, and CI.

These Fujitsu External floppy drives have a one year warranty. Completely compatible.
These are brand new slimline drives and they look great!
These drives retail for $259!

Fujitsu 800k 99.00!



19" & 20" Monitors!

20" Phillips Color System 75hz
256 colors With RasterOps8 Bit card.....$1498
16 Million colors w/Nat'l. Semi 24 Bit card.....$2298

19" Trinitron Color System 75hz
Ikegami CT-20 w/8 Bit Card.....$2398
16 Million colors w/Nat'l. Semi 24 Bit card.....$3098

19" Ikegami Grey scale and Mono
Mono.....$798
Grey Scale.....$1098

All above monitor systems include interface board and cable.

MACDIRECT 60 East Chestnut - 145, Chicago, IL 60611
Visa, Mastercard, Amex, COD, Telecheck Approved Checks, Gov., Corp., Univ., P.O.s welcome All new Drives, Preformatted with latest stable system software , Factory warranty, / Bracket, cables and software included/
30 Day Money back Guarantee on all drive products.

800-621-8467
Hours: 8:30 - 8:00 CST, Saturdays 10:00 - 4:00
Technical Service and Order Tracking call:
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Circle 140 on reader service card

ADVERTISER INDEX

SAY YOU SAW IT IN MACWORLD.

To purchase products advertised in this issue call the phone numbers below or use the reader service number for ourFastFacts Product Information Card located on the next page.



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280	AbraMacDabra	54	408/737-9454
206	Advanced Business Center	227	800/274-7747
197	AEC Software	83	800/346-9413
159	Amaze, Inc.	148	—
190	APS	15	800/235-2752
160	Apple	—	—
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241	Express Direct	1	800/535-3252
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283	P C Globe	—	800/255-2789
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14	Portfolio Systems	7	800/SAY-DYNO
210	Prescience	179	800/UCRMATH
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102	Thought I Could	19	212/673-9724
114	Tiger Software	14	800/888-4437
75	Timeworks	206	708/559-1310
220C	Webster Computer	123	800/457-0903
226	Wholesale 54	—	800/927-3157

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There's no cost; no obligation. Simply fill out the form and circle the numbers on the card below for the products which interest you.

Mail the card. We pay the postage!

Numbers for advertised products can be found in the ad and in both the Product Index and the Advertiser Index.

recycled paper contains 10% post consumer waste

FASTFAX

For faster results just fax this sheet to 413/637-4343. Please include your fax number where indicated.

Free Product Info

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MACWORLD

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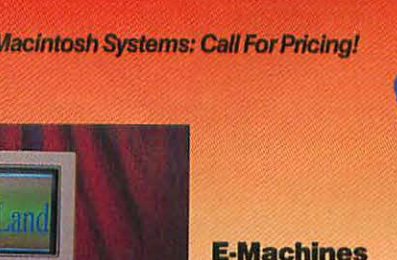
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ETC 337 Mb WREN-Runner-1, 10.7 ms	$1449.00
ETC 613 Mb WREN-5, 16.5 msec	$1549.00
ETC 676 Mb WREN-6, 15.5 msec	$1599.00
ETC 676 Mb WREN-Runner-2, 12 ms	$1899.00
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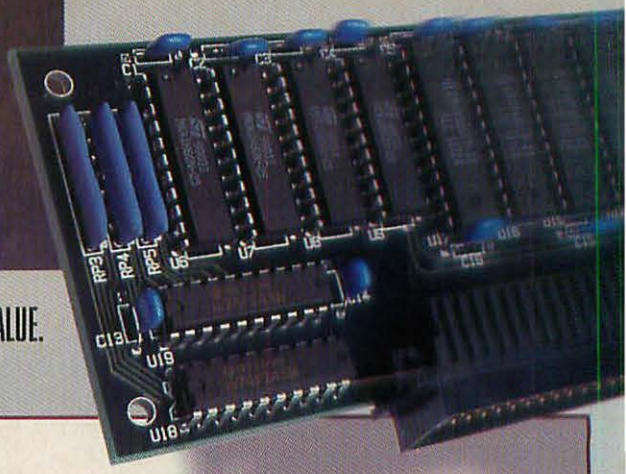
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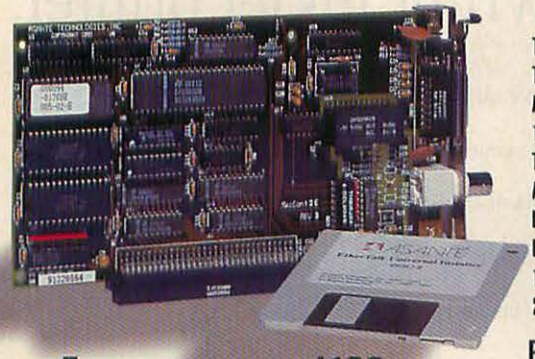
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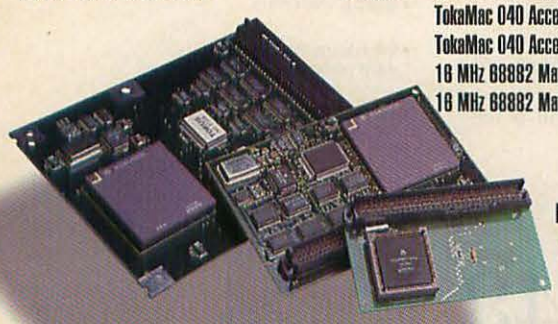
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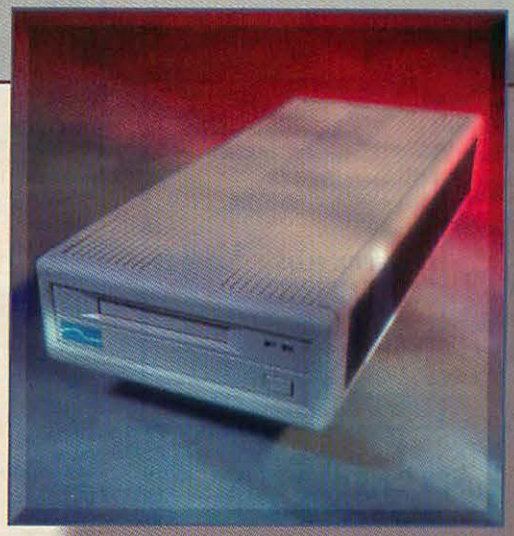


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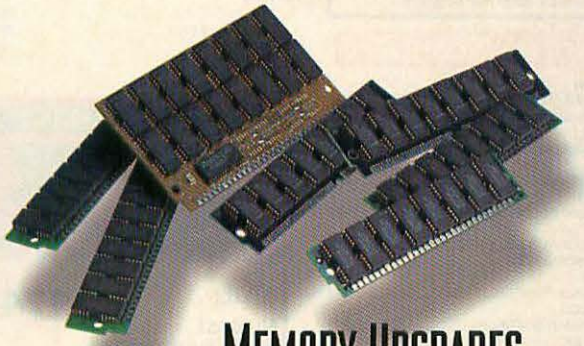
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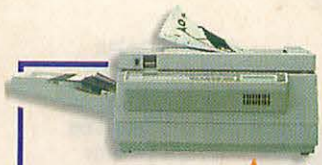
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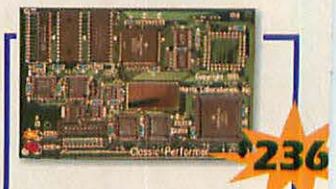


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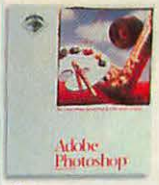
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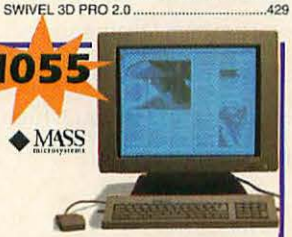
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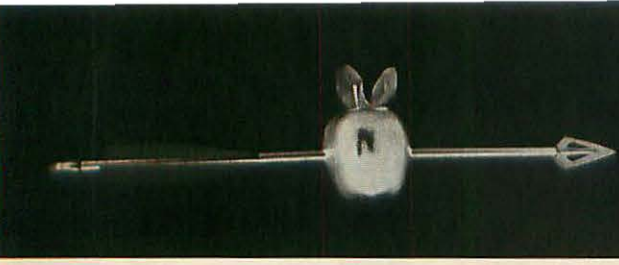
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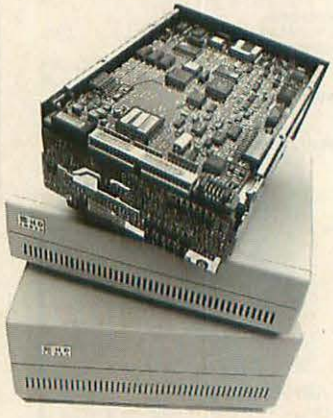
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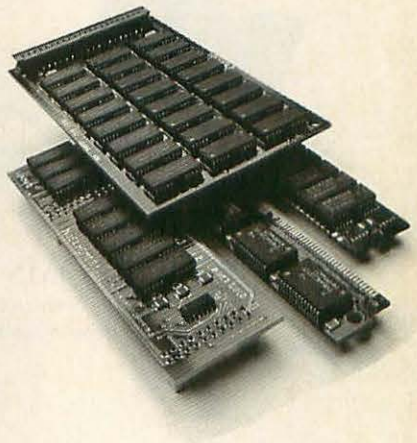
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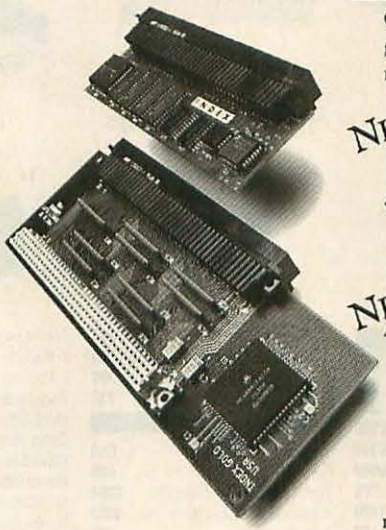
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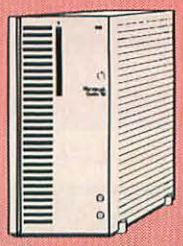
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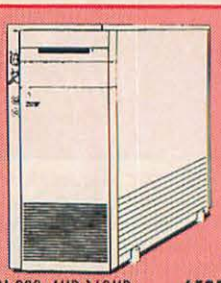
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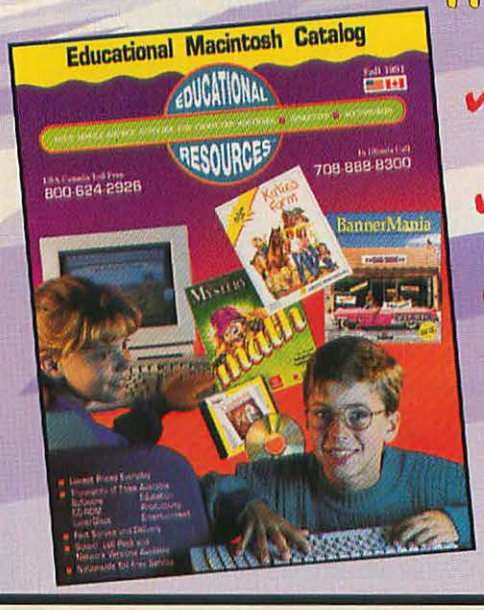
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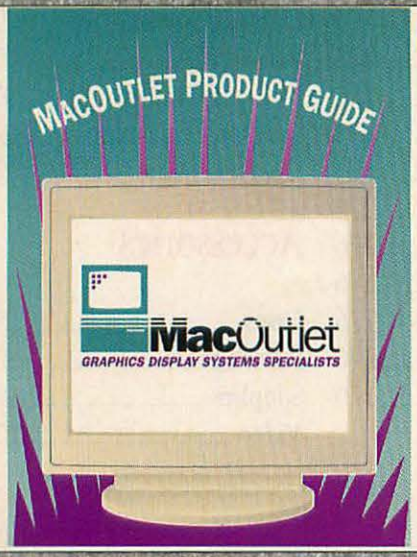
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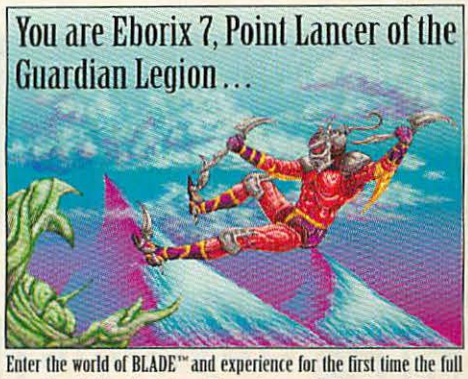
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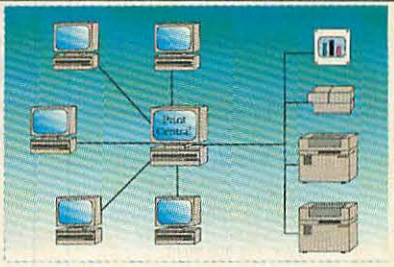
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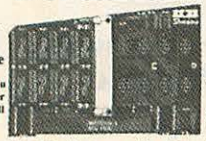
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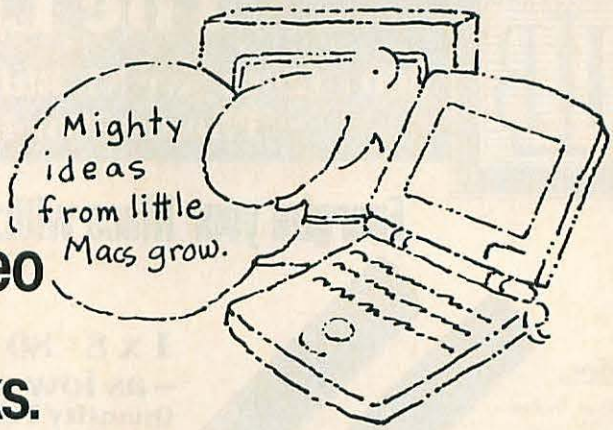
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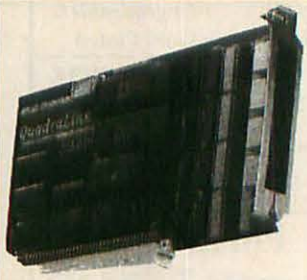
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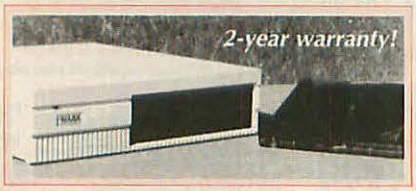


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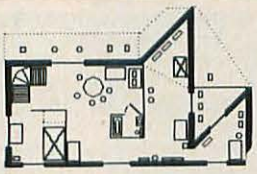
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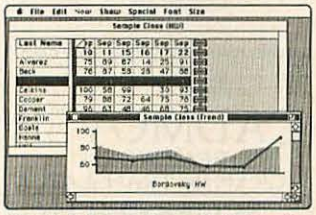
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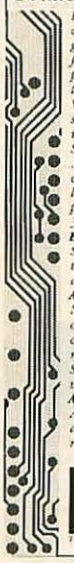
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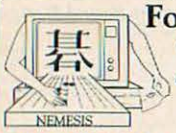
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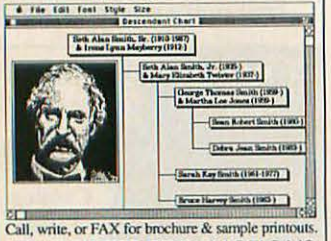
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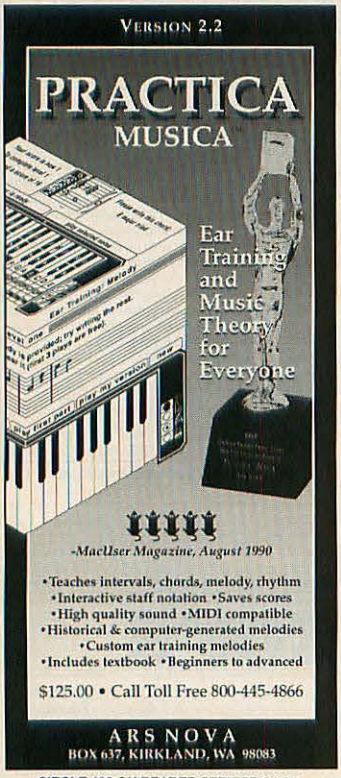
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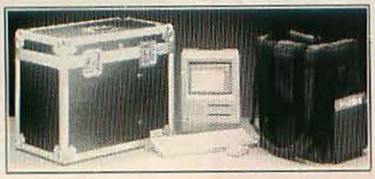
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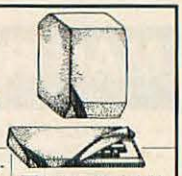
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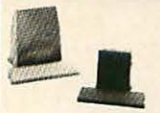


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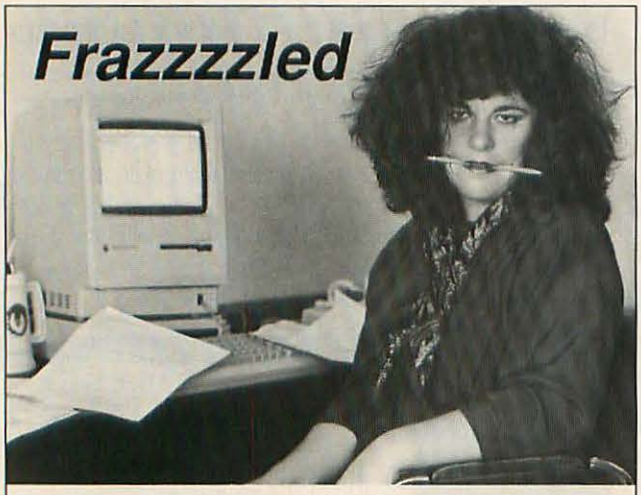
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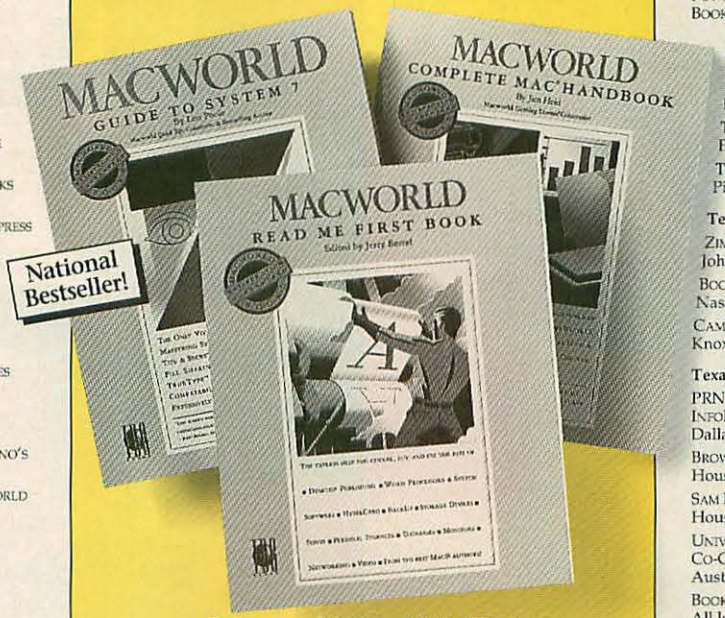
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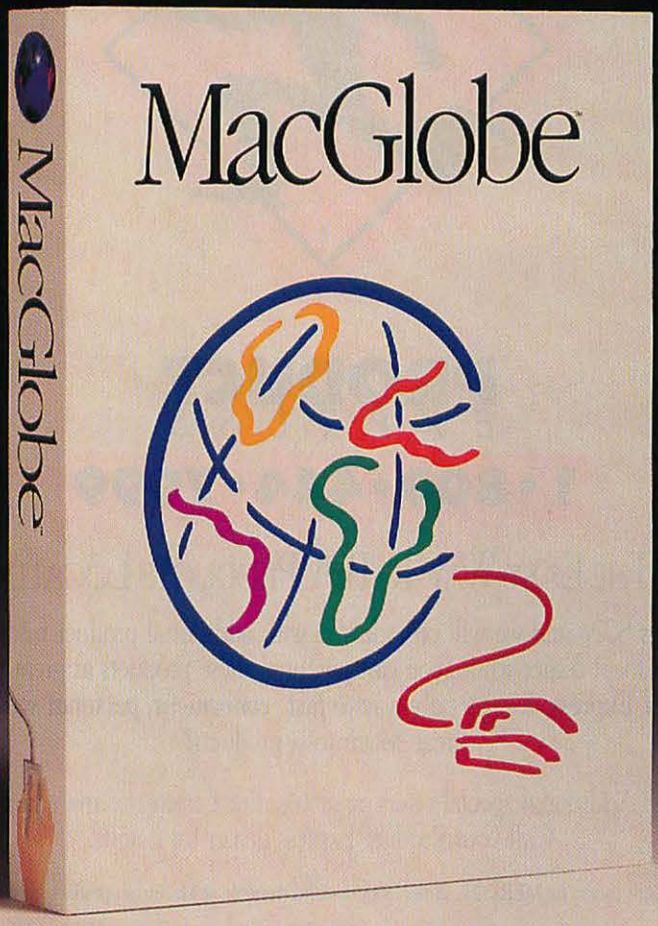
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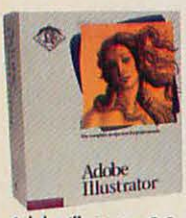


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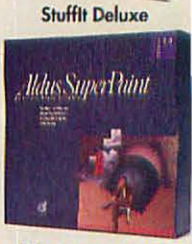


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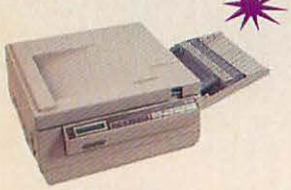
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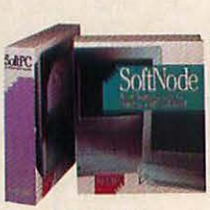
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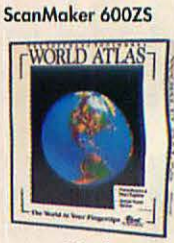

American Heritage Dictionary



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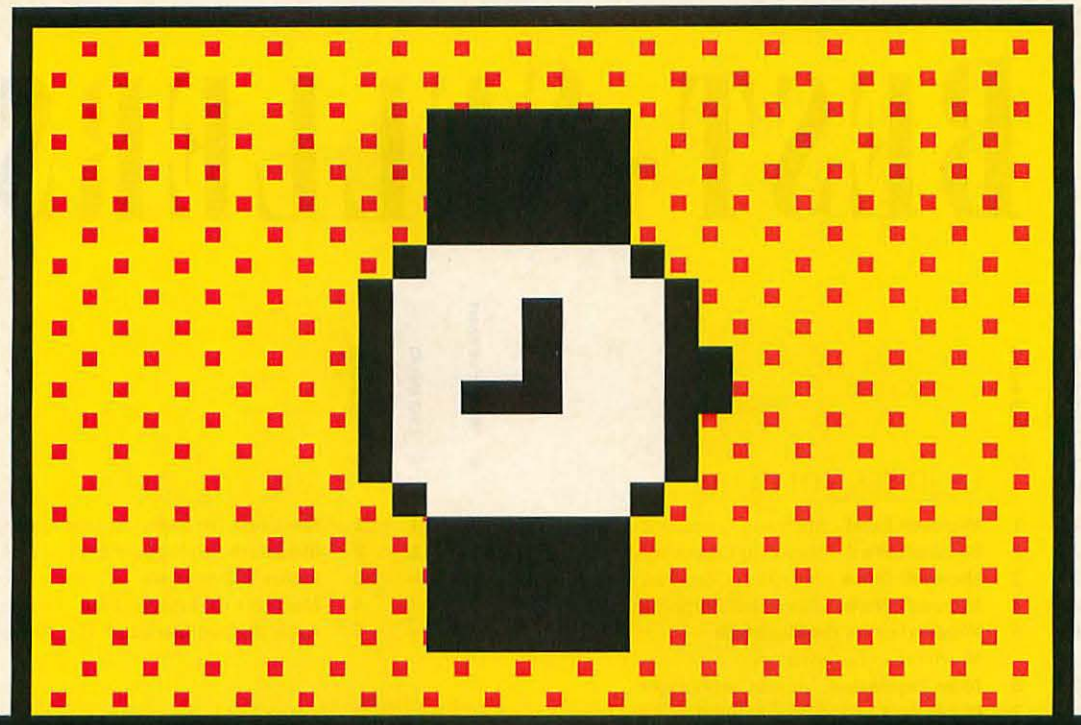
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System 7 savvy, **Adobe Illustrator 3.2** is easy-to-use, offers powerful illustration, page design and color separation capabilities. • **Alarming Events** is a desk accessory that keep track of events, appointments or anything you want to be reminded . • **Aldus SuperPaint 3.0** combines painting, drawing, and image-enhancement capabilities in one powerfu easy-to-use graphics program. • **The American Heritage Dictionary** is the most comprehensive and full featured dictionary available for the Macintosh. • **GreatWorks** combine applications in one package: word processing, database, spreadsheet, charting, drawing, painting, outlining and communications. • The **Hayes V.32 Ultra 96 Modem for th Mac** — Fast, Powerful, & Well Connected • **Mac TOPS 3.1** — Networking software for connecting Macs to Macs (System 6.X & 7.0) and Macs to PCs. • Play in real tournamen on real Tournament Players Club courses with **PGA Tour Golf**. • **PowerBundle** is a bundle of products for your PowerBook: WriteNow, ClickArt for Fax and Field, AddressBookPlu America Online, Business Expense Reports, and The PowerBundle Case. • Scan 24-bit color, 256 shades of gray and black and white at up to 600 dpi resolution with the **ScanMake 600ZS**. • The new **Smart Label Printer Plus** from **Seiko Instruments** is the most intelligent way to make labels for envelopes, filefolders, diskettes, barcodes or anything els Comes with a free copy of Touchbase! • **SoftNode** gives SoftPC users access to a Novell PC Network. • When you think of saving disk space or speeding modem transfer think of **StuffIt Deluxe**. • **SupraFAXModem Plus** - 9600 send/receive Fax - MNP 5 - V.43bis - FAXstf software - MicroPhone 1.5 - Cable - System 7 Compatible - 5 yr. warrant • **Thunder 7 & Talking Moose** — Fun and functionality with **Baseline Publishing** products! • **Timbuktu/Remote 3.0** provides color screen-sharing and file transf capabilities between Macs over modems. The **TrueLaser** page printer is rated one of the fastest in its class allowing it to run at speeds faster than conventional 68000 based printer Comes with a free, full working version of Adobe Photoshop! • **World Atlas** brings the entire globe to your computer screen.



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BEST-SELLERS

BUSINESS SOFTWARE

Months on chart	Last month	This month		
71	1	1	**Microsoft Excel**	Microsoft Corporation
80	2	2	**Microsoft Word**	Microsoft Corporation
2	3	3	**Microsoft Office**	Microsoft Corporation
58	—	4	**Microsoft Works**	Microsoft Corporation
32	8	5	**WordPerfect for the Macintosh**	WordPerfect Corporation
67	7	6	**Aldus PageMaker**	Aldus Corporation
14	—	7	**MacProject**	Claris Corporation
1	—	8	**Aldus Persuasion**	Aldus Corporation
56	—	9	**MacDraw II**	Claris Corporation
2	—	10	**Microsoft PowerPoint**	Microsoft Corporation
56	4	11	**MacWrite II**	Claris Corporation
32	9	12	**FileMaker Pro**	Claris Corporation
1	—	13	**DeltaGraph**	DeltaPoint
18	—	14	**Quicken**	Intuit
2*	6	15	**MacDraw Pro**	Claris Corporation

EDUCATION SOFTWARE

Months on chart	Last month	This month		
47	2	1	**Reader Rabbit**	The Learning Company
58	4	2	**Math Blaster**	Davidson & Associates
14	1	3	**Where in Time Is Carmen Sandiego?**	Brøderbund Software
33	—	4	**Where in the World Is Carmen Sandiego?**	Brøderbund Software
2	5	5	**The Playroom**	Brøderbund Software

ENTERTAINMENT SOFTWARE

Months on chart	Last month	This month		
45	—	1	**Microsoft Flight Simulator**	Microsoft Corporation
10	2	2	**SimEarth**	Maxis
2	5	3	**Bridge**	Artworx
1	—	4	**Oids**	FTL Games
22	—	5	**Tetris**	Spectrum HoloByte

NETWORK/DATA COMMUNICATIONS

Months on chart	Last month	This month		
28	—	1	**PhoneNet**	Farallon Computing
12	—	2	**MacLink Plus**	DataViz
1	—	3	**3+Open for Macintosh**	3Com Corporation
13	1	4	**White Knight**	FreeSoft
59	2	5	**TOPS**	Sitka Corporation

ADD-IN BOARDS

Months on chart	Last month	This month		
9	1	1	**Macintosh IIsi NuBus Adapter Card**	Apple Computer
13	5	2	**Macintosh Display Card 8•24**	Apple Computer
15	—	3	**Radius TPD Interface**	Radius
1	—	4	**MacCon+ LC Ethernet Card**	Asante Technologies
2	—	5	**Apple IIe Card Macintosh LC**	Apple Computer

UTILITY SOFTWARE

Months on chart	Last month	This month		
8	1	1	**After Dark**	Berkeley Systems
15	2	2	**The Norton Utilities for the Macintosh**	Symantec Corporation
21	3	3	**SAM II**	Symantec Corporation
1	—	4	**Suitcase II**	Fifth Generation Systems
9	—	5	**Virex**	Microcom

PRODUCT WATCH

Recent or forthcoming products of particular interest.

The Far Side Computer Calendar
Amaze
One year's worth of Gary Larson cartoons with a perpetual calendar personal organizer

Thumbelina
Appoint
Miniature full-function trackball

ShadowWriter
Gizmo Technologies
Networking software for low-cost printers

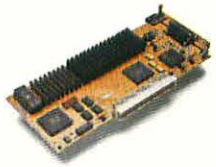
Source: Exclusive Audits & Surveys research from more than 250 Macintosh retailers and selected mail-order vendors. Covers sales during September 1991

*Reflects adjusted figure.



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Introducing the latest in PrecisionColor™ technology from Radius. The most versatile and cost-effective 8 and 24-bit color video cards money can buy. Thanks to our own custom-designed ASIC chips, we can price these new PrecisionColor interfaces so low – our competition is turning green with envy. What's more, these new interfaces work with virtually any color display ever made for the Macintosh. Which means true 24-bit color is now an affordable reality for everyone. ● PrecisionColor 8 ($599) gives you a full 256 colors. PrecisionColor 8x ($899) lets you upgrade to 16 or 24-bit color. Both PrecisionColor 8x and 24x ($1999) also give you the added benefits of on-board acceleration. Regardless of which one you choose, all our PrecisionColor cards allow you to view images in the resolution of your choice – 640 x 480, 1024 x 768, 1152 x 882 and 1152 x 870. And, if you're connected to our new PrecisionColor Display/20, you can switch resolutions on the fly. Leaping from presentation to WYSIWYG to two-page mode without restarting your Macintosh. ● Our multi-frequency PrecisionColor Display/20 works with a variety of both Macintosh and PC video cards. Its built-in microprocessor syncs with the video card to provide the best possible image for your selected resolution. And its extensive controls lets you fine tune the screen for a perfect image every time. ● Call 1-800-227-2795 for the name of the Radius Authorized Reseller who can show you our new PrecisionColor products. At these prices, you can't afford to be without one.



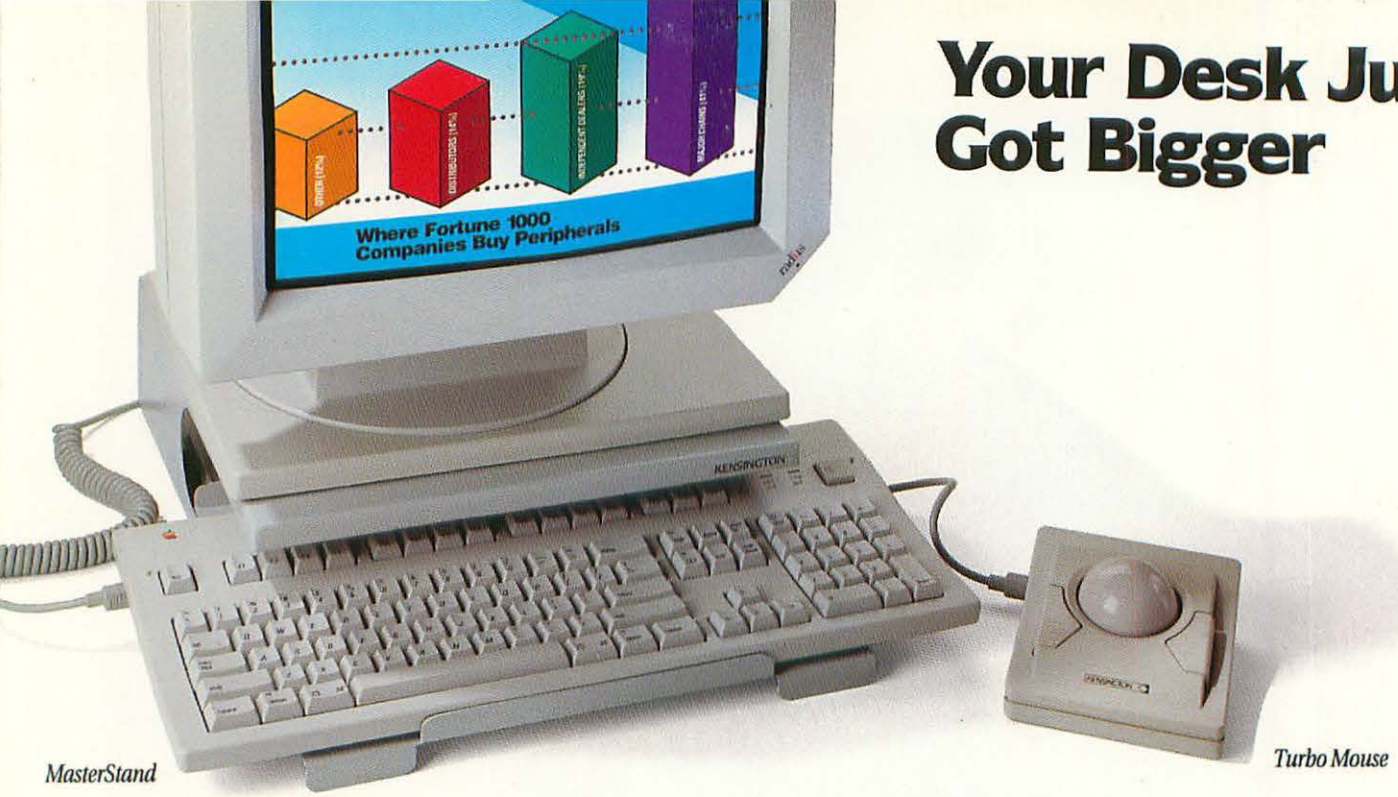
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Turbo Mouse

Kensington introduces MasterStand and LaserStand to its complete line of space savers.

The more stuff we put on our desk the smaller it seems to get.

And with a CPU, keyboard, monitor, printer and mouse, there's hardly room left for anything else.

But don't give up. You can make your desk bigger with one, or a combination of space saving products from Kensington.

MasterStand™ saves space by letting you slide your keyboard underneath your Mac or large screen monitor. It even turns a narrow desk, credenza or file cabinet into a workstation by extending the keyboard eight inches.

Want to store all your LaserWriter® II supplies in one convenient place?

With *LaserStand*, there's room on one end for two reams of paper and up to 75 envelopes. The other end *(not shown)* holds two extra paper trays. And a convenient side compartment protects, organizes and hides printer cables.



Keyboard Shelf

For dot matrix printers, our *Space Saving Printer Stand* is the answer for maximum storage with a minimum footprint.

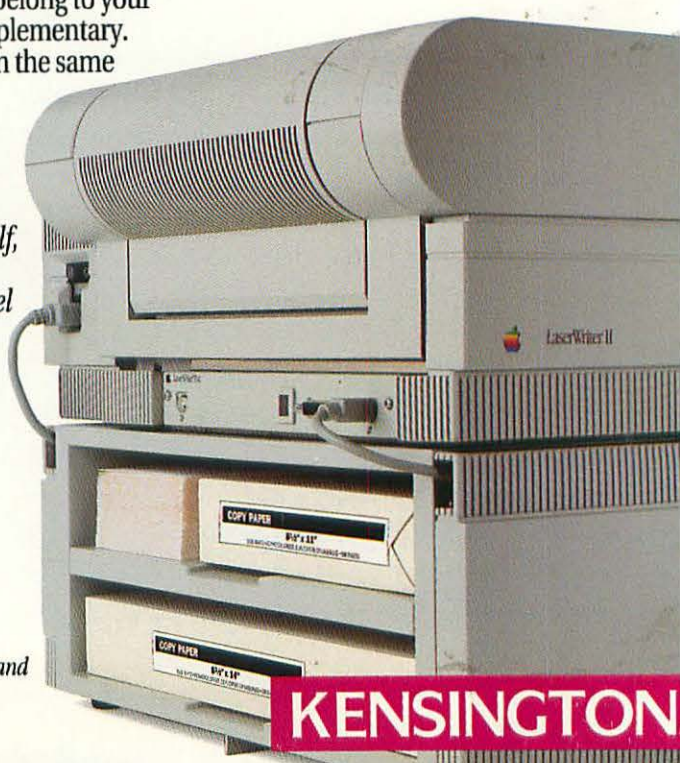


Space Saving Printer Stand

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